



March 6, 2015

Marina Voskanian, P.E.  
Division Chief  
Mineral Resources Management  
California State Lands Commission  
200 Oceangate, 12<sup>th</sup> Floor  
Long Beach, CA 90802-4331

**RE: Adjustment to Existing Easterly Boundary of PRC 3242.1**

Dear Ms. Voskanian,

On February 27, 2015 Venoco, Inc requested an amendment to the subject Project Description titled "Adjustment to Existing Easterly Boundary of PRC 3242.1". This letter is a follow-up to that request and provides a detailed list of changes made to the Project Description (This list is provided as Attachment 1).

As noted, the change includes a decrease in the size of the requested adjustment area as well as a revised description of the lands currently held by PRC 3242.1 and PRC 3120.1 that upon approval of the project would be quitclaimed back to the State. After adjustments and survey, the area of the requested lease adjustment will be reduced from 5,327 acres to 3,400 acres. The total acreage proposed to be quitclaimed from both PRC 3242.1 and PRC 3120.1 is 3,831 acres. The net acreage holding after the PRC 3242.1 lease line adjustment will decrease by 431 acres. This project will result in a net of 431 acres quitclaimed back to the State of California. See attached Figures (in Attachment 2) for detail on the adjusted PRC 3242.1 boundary and quitclaim areas.

As part of this proposal, Venoco intends to reserve existing pipeline and power cable corridors, pursuant to its existing leasehold rights or by obtaining new surface right-of-way(s) to cross a portion of existing PRC 3120.1 connecting Platform Holly to Shore. The details of this corridor are not yet fully defined and will require some additional investigation. Venoco will provide details as soon as they are available.

Should you have any questions or require additional information, please do not hesitate to contact me at (805)-745-2266

Sincerely,

Chris Peltonen Ph.D.  
Development Manager  
Venoco, Inc

Attached:      **Attachment 1:** List of Revisions made to the Project Description – “Adjustment to Existing Easterly Boundary of PRC 3242.1” submitted by Venoco, Inc on June 30, 2014.

**Attachment 2:** Revised Figures

cc:              Eric Gillis, SLC Sacramento  
                    Shahed Meshkati, SLC Long Beach  
                    Mark Le Clair, SLC Long Beach  
                    Ian Livett, Venoco  
                    George Ramsay, Venoco

# **Adjustment to Existing Easterly Boundary of PRC 3242.1**

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**June 30, 2014**

Venoco, Inc.  
6267 Carpinteria Avenue, Suite 100  
Carpinteria, CA 93013  
Tel: 805.745.2100 ■ Fax: 805.745.2217

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## APPENDICES

## APPENDIX A. PROPOSED WELL PLANS AND REPRESENTATIVE DRILLING PROGRAMS

## Extension Well # 1, 3242-10 RD2

- Abandonment Program
- Current WBD
- Proposed Abandonment WBD
- Drilling Program
- Proposed Drilling WBD

## Extension Well #2, 3242-14 RD1

- Abandonment Program
- Current WBD
- Proposed Abandonment WBD
- Drilling Program
- Proposed Drilling WBD

## Extension Well # 3, 3242-11 RD1

- Abandonment Program
- Current WBD
- Proposed Abandonment WBD
- Drilling Program
- Proposed Drilling WBD

## Extension Well # 4, 3242-21

- Abandonment Program
- Current WBD
- Proposed Abandonment WBD
- Drilling Program
- Proposed Drilling WBD

## Extension Well #5, 3242-22

- Abandonment Program
- Current WBD
- Proposed Abandonment WBD
- Drilling Program
- Proposed Drilling WBD

## Extension Well #6, 3242-23

- Abandonment Program
- Current WBD
- Proposed Abandonment WBD
- Drilling Program
- Proposed Drilling WBD

## REVISION HISTORY

DATE	DESCRIPTION
APRIL 24, 2014	ISSUED FOR CSLC REVIEW
JUNE 30, 2014	RESUBMITTED FOR CSLC REVIEW

## S E C T I O N 1

# Program Logistics

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## 1.1 TITLE

This project is identified as “**ADJUSTMENT TO EXISTING EASTERLY LEASE LINE FOR PRC 3242.1**” with related re-drills of existing wells from Platform Holly.

## 1.2 LEAD AGENCY NAME AND ADDRESS

California State Lands Commission  
100 Howe Avenue, Suite 100-South  
Sacramento, CA 95825-8202

## 1.3 CONTACT PERSONS AND PHONE NUMBERS

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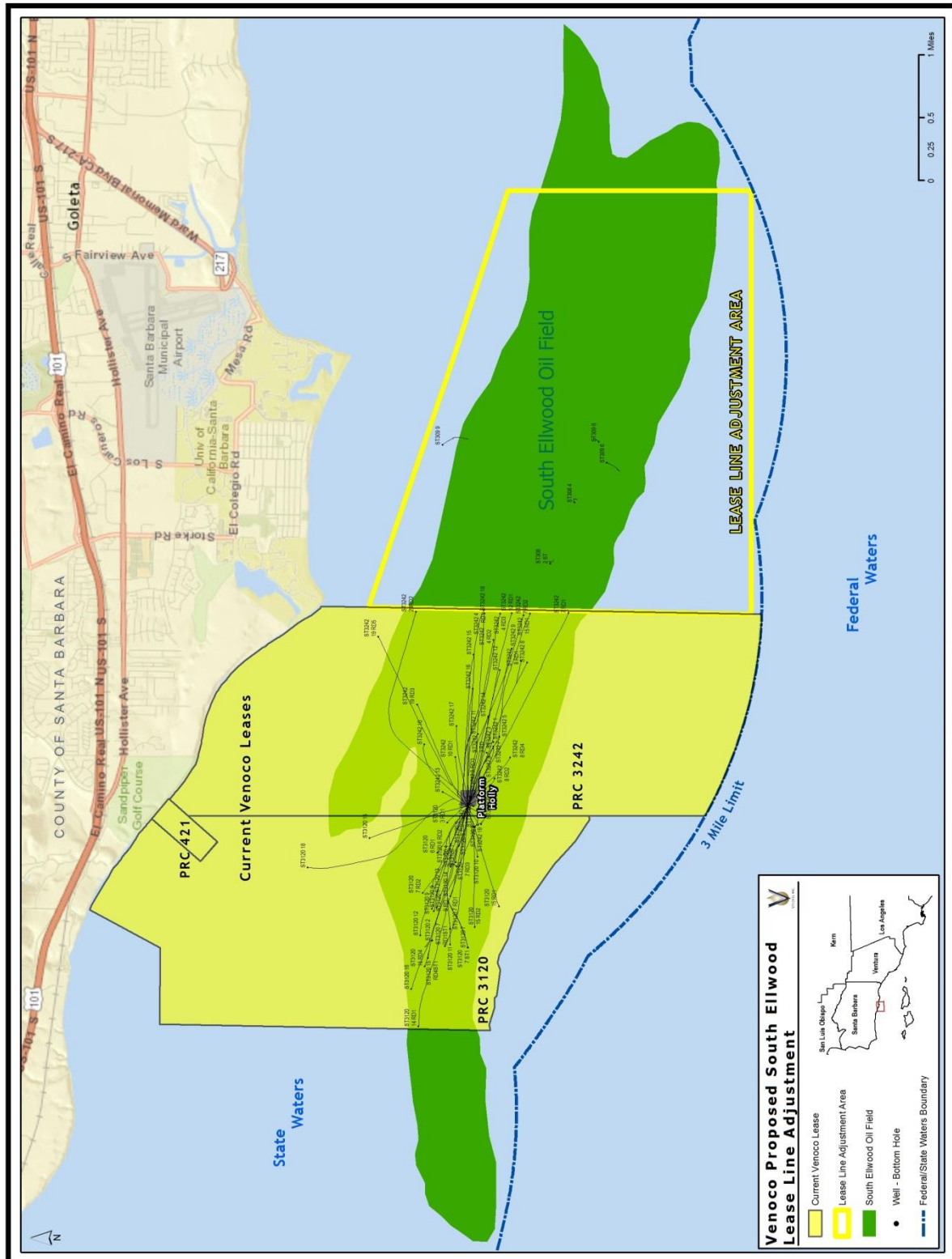
[Shahed Meshkati, Chief, Planning and Development](#)  
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[Shahed.Meshkati@slc.ca.gov](mailto:Shahed.Meshkati@slc.ca.gov)

## 1.4 LOCATION

PRC 3242.1 is located within the South Ellwood Field. The South Ellwood (SE) Field is located 2.4 miles offshore in the Santa Barbara Channel and in State waters. The field is located offshore of the city of Goleta, California. Portions of the SE field also lie within State lease PRC 3120.1. Presently, the South Ellwood Field extends at least 3.75 miles east of the existing PRC 3242.1. This project will adjust the existing, easternmost boundary of PRC 3242.1 to allow for a more efficient utilization of state resources. After adjustment, the net acreage holding of Venoco will increase, by about 5,327 acres.

In addition, it is proposed to re-drill up to six (6) existing wells into the adjusted lease area. Re-drilling of extension wells will take place from the existing Platform Holly, which is located on PRC 3242.1 (at latitude 34°23'23.2"N, longitude 119°54'19.7"W), approximately 2.4 miles offshore Coal Oil Point, Goleta, Santa Barbara County in about 211 feet of water. See Figure 1.4-1 for location map and depiction of adjusted eastern lease line boundary.

1: Figure 1.4-1 Location Map



## **1.5 SPONSOR'S NAME AND ADDRESS**

Venoco, Inc.  
6267 Carpinteria Avenue, Suite 100  
Carpinteria, CA 93013-142  
Contact: Steve Greig, 805-745-2255



## S E C T I O N 2

## Program Background

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### 2.1 SOUTH ELLWOOD FIELD SUMMARY

State Lease PRC 3120.1 was acquired by Atlantic Richfield Company (ARCO) and Mobil in 1964, and State Lease PRC 3242.1 was acquired by Atlantic Richfield Company and Mobil in 1965. At the beginning of production from the leases, operations were conducted by ARCO. ARCO turned over operations to Mobil in 1993. Venoco, Inc. purchased the leases from Mobil in August 1997, and has operated the onshore and offshore facilities since that time.

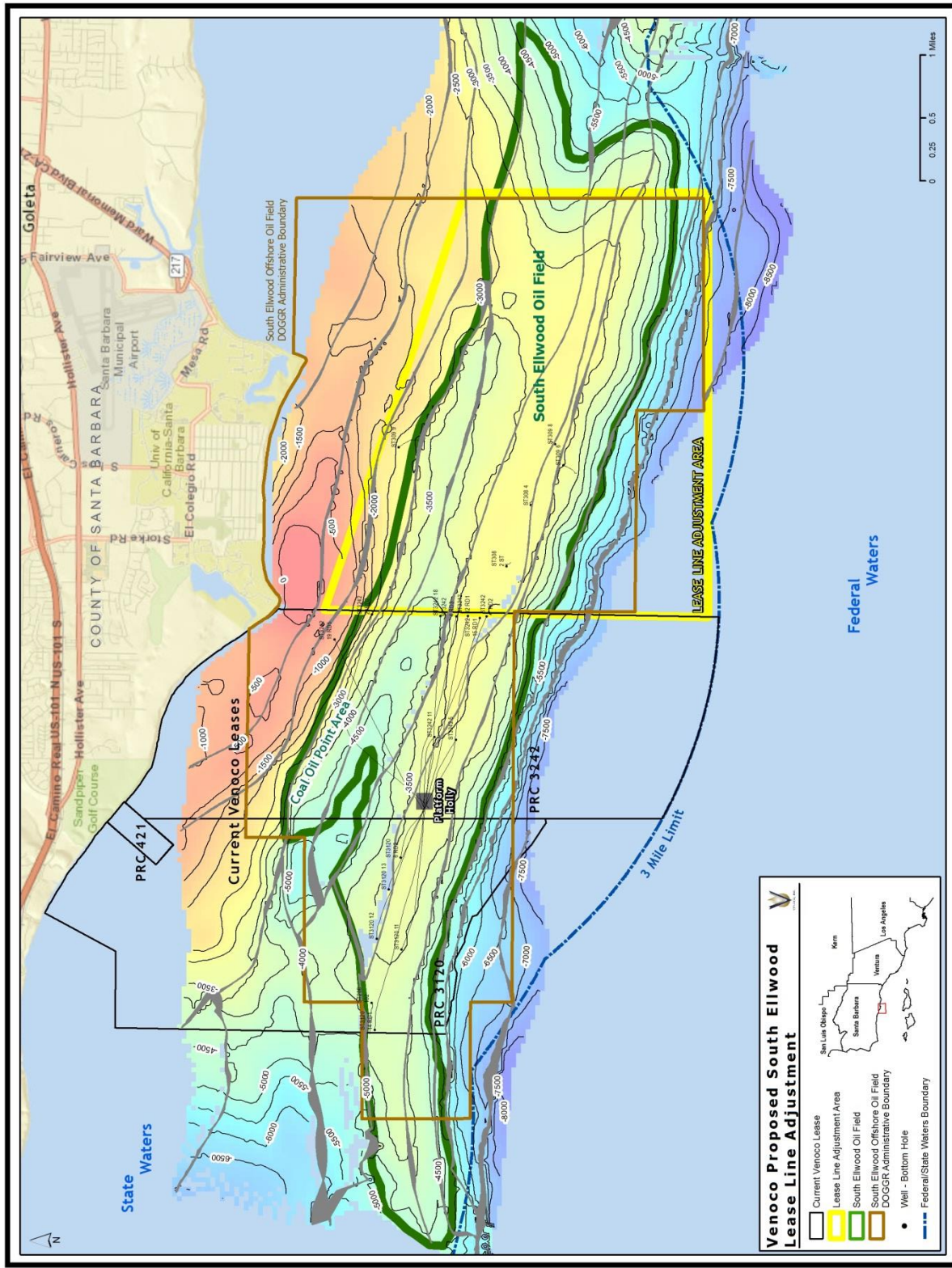
The South Ellwood structure is an approximately 9-mile long by 2-mile wide NW-SE trending, doubly plunging pair of faulted anticlines. The structures verge to the south, with a doubly-plunging syncline between anticlinal highs. The synclinal area partially separates the South Ellwood Main area from the next anticlinal high to the north (Coal Oil Point area), until the two areas merge in saddles in the northwest and the southeast part of the field (see Structure Map, Figure 2.1-1). Oil and gas pools in the SE field include the Middle Miocene Monterey Formation, the Lower Miocene Rincon Formation, and the Oligocene Vaqueros and Sespe Formations (Refer to Figure 2.1-2, Offshore Stratigraphic Column). Formation tops for these stratigraphic units lie at depths of approximately -3,000 to -5,800 feet subsea.

Current production is from the Monterey Formation in the Main area (13 wells) and the Coal Oil Point area (1 well) (Figure 2.1-1). The south flank of the Coal Oil Point area was proven productive in the Monterey Formation in 2013 and produces at pressures similar to the South Ellwood Main area wells. South Ellwood field outline (see Figure 2.1-1) includes the proven productive areas of the Monterey structure down to 1.) a lowest known oil (LKO) of -4800' tvdss, and 2.) along northern faults that enclose proven production.

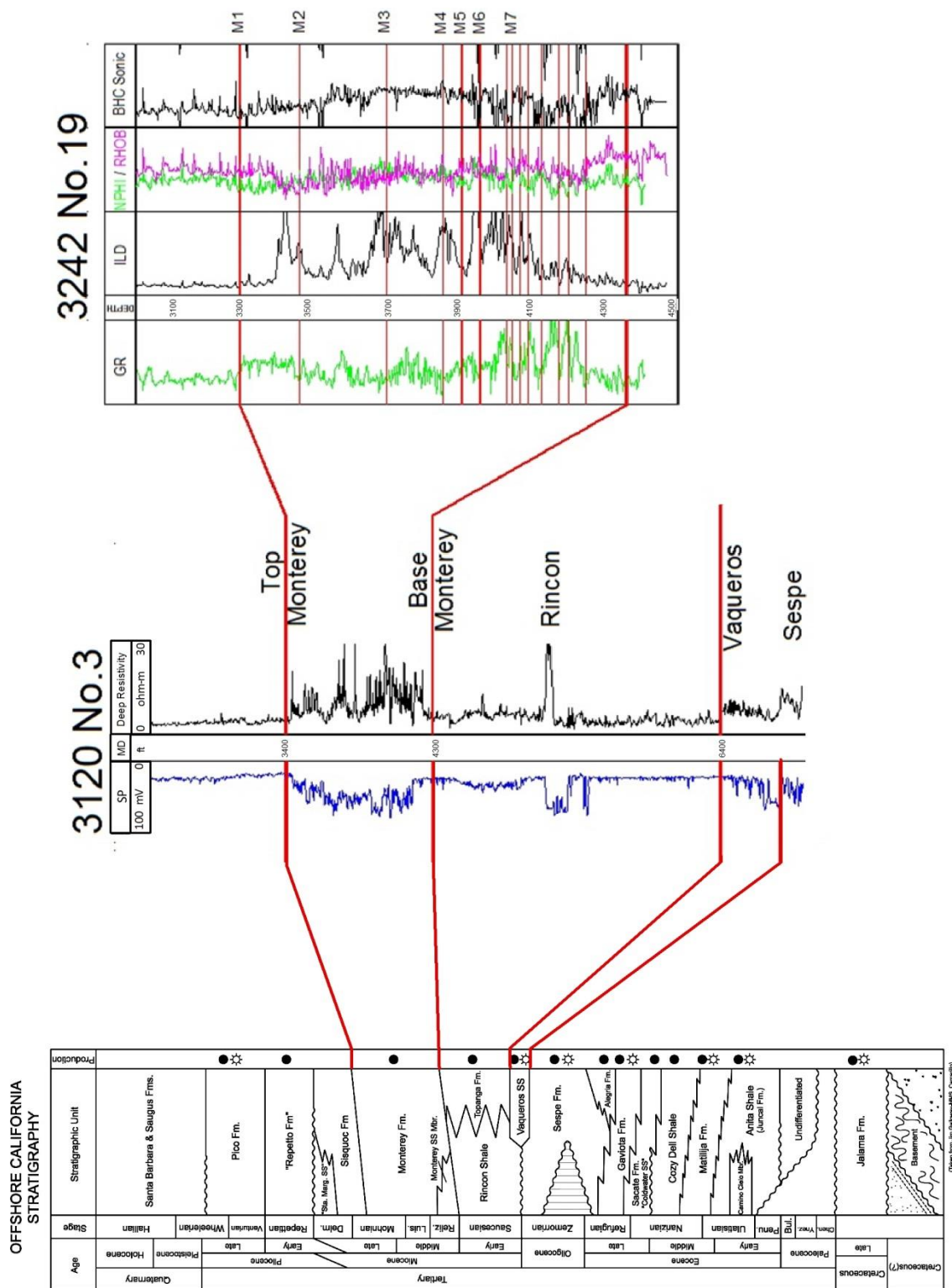
The portion of the South Ellwood structure currently held by Venoco, Inc (3120.1 and 3242.1) holds an estimated 1.2 billion stock tank barrels of oil (STB). Approximately seventy five million barrels (bbls) have been produced from the field since 1969, and an estimated twenty five million bbls of recoverable oil remains to be produced within Venoco's existing leases.

Historical production data from 2007 through mid-2012 (Figure 2.1-3) shows a gentle annual decline rate of less than 10% per year. This is due to natural water encroachment, which acts as natural partial pressure maintenance to the reservoir. An active drilling program began in 2012 which increased production from approximately 2,000 BOPD to over 6,000 BOPD (barrels of oil per day). At present, production has stabilized at just over 4,200 BOPD.

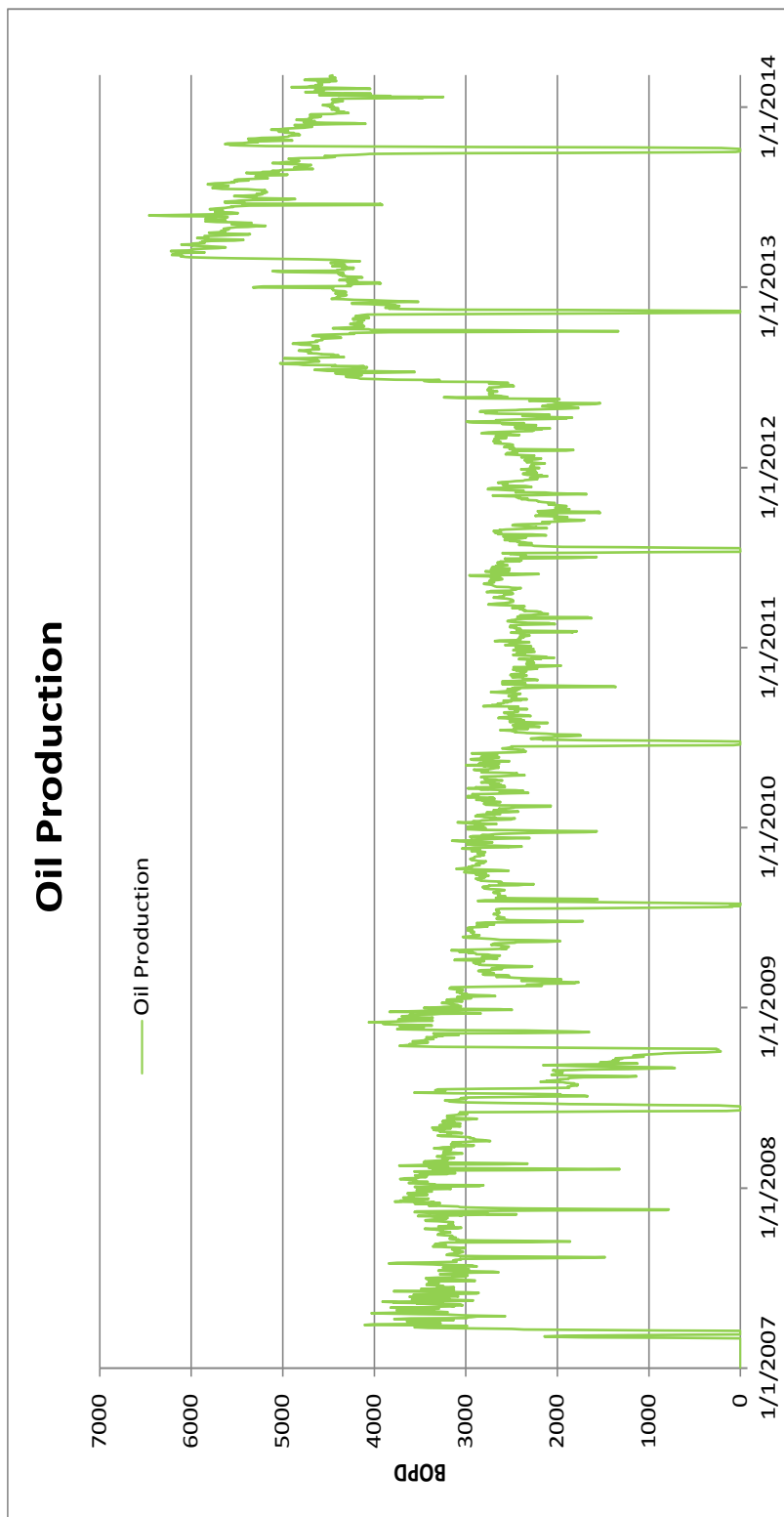
2: Figure 2.1-1 Structure-Contour Map South Ellwood Offshore Oil Field



### 3: Figure 2.1-2 Offshore Stratigraphic Column



4: Figure 2.1-3 Historical Oil Production



## **2.2 PRC 3242 LEASE SUMMARY**

The existing state lease 3242.1 comprises approximately 4,290 acres. This program will adjust the eastern boundary so as to extend the lease to allow for more efficient production of state resources. The net acreage after adjustment will increase by 5,327 acres to a total of 9,617 acres.

## **2.3 GEOMORPHIC AND GEOLOGIC SETTING**

The program area is situated in the Santa Barbara Channel, within the northwest portion of the Transverse Range Province of Southern California. The Transverse Ranges are characterized by predominantly east-west trending topographic and structural elements that include extensive faulting, folds, mountain ranges, and valleys or basins. Physiographic features include the mainland shelf offshore, a raised platform or terrace along the coastline, and low hills and mountainous terrain that form the southern flank of the Santa Ynez Mountains. Depositional environments of the rocks making up these structural features progress from older fluvial-deltaic Oligocene sandstones and shales, to transgressive Miocene marine sandstones, deep water biogenic Miocene shales (Monterey Formation), to shallower water shelf sandstones and shales.

The Miocene Monterey Formation at South Ellwood field is a highly continuous and thick reservoir (1,000'-1,200') composed of deep marine siliceous rocks. The formation is divided into 7 main producing sub-zones (see Stratigraphic Column, Figure 2.1-2). The lithologies making up the Monterey Formation are inter-bedded layers of chert, dolomite, porcelanite, organic mudstone, and siliceous shales. The first three lithologies listed are all generally highly fractured due to their brittle nature, combined with the strong folding and faulting history at South Ellwood Field. Organic mudstones and shale layers (where present) are more ductile lithologies and do not fracture as easily, thereby acting as vertical baffles or barriers. The lower Monterey (M6 & M7) contains thicker sections (20'-50') of the more ductile lithologies, which are not present in the upper Monterey. Therefore, the upper Monterey in general has higher vertical connectivity through the fracture system, while the lower Monterey has a greater degree of vertical compartmentalization. The Monterey Formation is sealed above by thick low permeability shale of the Sisquoc Formation.

## S E C T I O N 3

## Program Description

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### 3.1 OBJECTIVES

The objective of the project is to enable more efficient production of State resources by adjusting the existing Easterly boundary of 3242.1 to encompass all of the field, which is only partially contained with the existing lease. The project proposes to re-drill (using existing platform wells) extension wells into the adjusted lease area. The goals of the project are as follows:

1. More efficient reserve recovery of the remaining oil in place.
2. Target areas of the field with significant remaining reserves to maximize economic recovery of State resources.
3. Provide better access to portions of the reservoir not efficiently drained by existing wells.
4. Complete project with no changes/modifications at the Ellwood Onshore Facility (EOF).

The project is expected to add up to 60 million barrels (within the existing reservoir) to the recoverable reserves of the South Ellwood Field, and it does not affect the life of the field. Additional production from this program does not constitute “New” production, as defined by County of Santa Barbara statutes<sup>1</sup>. The absence of the program will not result in an early cessation of production on Platform Holly and processing at the EOF; these facilities will continue to operate. No new lease or extension of existing lease term is required for this program, and no program-related changes are proposed onshore at EOF.

### 3.2 ADJUSTMENT OF LEASE BOUNDARY

Pursuant to Section 6872.5 of the Public Resources Code, Venoco, Inc. proposes to adjust the existing easterly boundary of existing oil and gas lease 3242.1 to encompass the eastward section of the South Ellwood Field as shown on Figure 3.2-1. The proposed project meets the conditions detailed in PRC 6872.5 that allows for the State Lands Commission, as a discretionary action to make these adjustments. Specifically these are:

1. The lease boundary adjustment will effectuate a more efficient utilization of State resources.
2. The proposed project will not increase the number of platforms.

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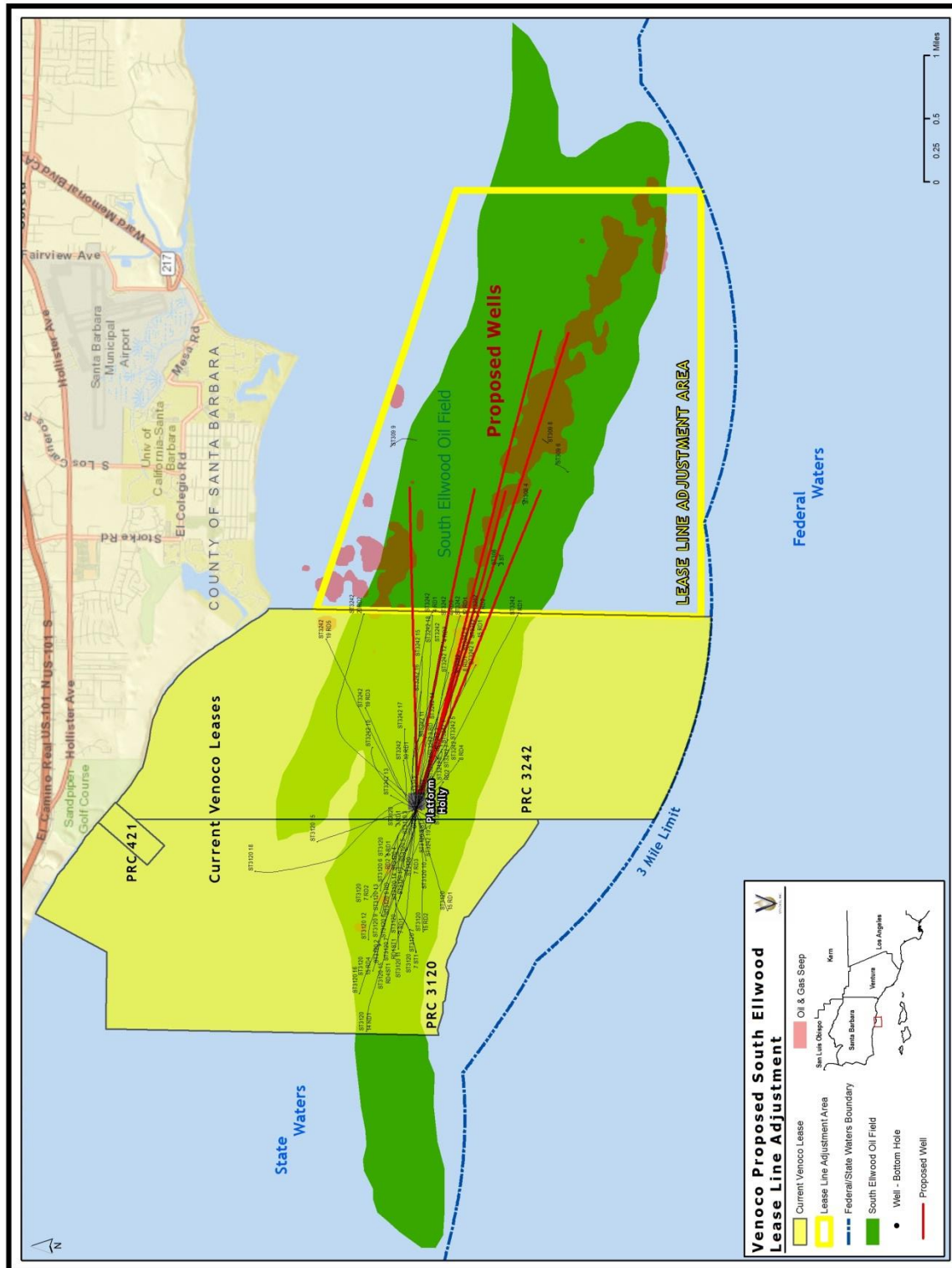
<sup>1</sup> Refer to Santa Barbara County Coastal Zoning Ordinance, Division 9, Section 35-154, ¶1.

3. The proposed project will not require the construction or major modification of a refinery.
4. The proposed project is the environmentally least damaging feasible alternative for the extraction and production of the affected resources.



**5: Figure 3.2-1 Proposed lease Line Adjustment**

(Yellow line indicates proposed PRC 3242.1 boundary adjustment)





### 3.3 PRODUCTION FORECAST & RESERVES

The portion of the South Ellwood structure currently operated by Venoco, Inc (3120.1 and 3242.1) held an estimated 1.2 billion original stock tank barrels of oil (STB). Approximately seventy five million barrels (bbls) have been produced from the field since 1969, and an estimated twenty five million bbls of recoverable oil remains to be produced within Venoco's existing leases. This is equivalent to a recovery factor of approximately 8%.

The portion of the South Ellwood structure that lies within the proposed lease line adjustment area (Figure 2.1-1) holds an estimated range of 840 million to 1.95 billion stock tank barrels of remaining oil in place. The estimated amount of hydrocarbons to be recovered from this project has a wide range due to the lack of data constraining remaining oil in place as well as uncertainty in reservoir performance. Our maximum expected recovery for this 6 well project is approximately 60 million incremental barrels of oil from the proposed lease line adjustment area. The estimated ultimate recovery per well (EUR) ranges from 3 million barrels of oil (MMBO) to 10.25 MMBO. But as with any oil development project, the cost of development impacts the expected recovery. If it is found that costs exceed expectations or reserves are less than expected it could result in the termination of the project.

Based upon confirmed third party resource analysis, existing production (legacy production) will continue for an additional 40 plus years. At current oil prices, remaining recoverable reserves (as of 1/1/2014) are approximately 25 million barrels of oil based on our current rate of approximately 4200 BOPD and projected declines. In order to characterize remaining reserves associated with re-drills within the adjusted lease boundary, a start date of August 2017 was assumed for the project. Remaining legacy reserves as of that date are estimated to be approximately 20 million barrels of oil.

Table 3.3-1 reflects base case estimated initial production rates for the six proposed extension wells to be re-drilled from Platform Holly. Base case assumptions assume a GOR of 500 scf/bbl and approximately 25% water cut initially from the wells. Incremental reserves associated with this case are approximately 60 million barrels of oil, resulting in ultimate incremental recovery from the field (as of 8/2017) at approximately 80 million barrels of oil.

An estimated range of recoverable reserves and initial production rates were based on deterministically derived values using up-scaled analog information associated with wells completed in the Monterey formation on the 3242.1 lease. As proposed, the development of the lease line adjustment area will include the drilling of 6 extended reach wells. Recoverable reserves could range from 3 MMBO to 10.25 MMBO per well and initial production rates of 3500 BOPD per well have been assumed as maximum expected values. The actual initial production rates could vary widely based on many factors. Below is a table of the wells analyzed with their associated performance characteristics (Table 3.3-2). It is important to note that the 6 extended reach wells of this project will have significantly more exposure to reservoir/pay than any of the analog wells (average 2.7 times greater).

**1: Table 3.3-1 Initial Production Rate**

I.D.	Well No <sup>2</sup> (Previous Well #)	Slot	Oil Rate (BOPD)	Gas Rate (MMSCFD)	Water Rate (BWPd)
Extension Re-drill #1	3242-10 RD2	E-3	3500	1.75	900
Extension Re-drill #2	3242-14 RD1	E-9	3500	1.75	900
Extension Re-drill #3	3242-11 RD1	E-5	3500	1.75	900
Extension Re-drill #4	3242-21 (3120-07 RD3)	W-9	3500	1.75	900
Extension Re-drill #5	3242-22 (3120-13)	W-2	3500	1.75	900
Extension Re-drill #6	3242-23 (3120-10)	C-10	3500	1.75	900

**2: Table 3.3-2 Analog Wells – Performance**

<u>Well</u>	<u>Estimated EUR</u>	<u>IP/Peak Performance</u>
3242-11	2,569,959	1500
3242-18	14,146,179	3000
3242-15	4,169,240	1000
3242-12	9,893,734	2500
3242-9	2,585,047	1200
3242-7	2,689,931	1000
3242-4	1,498,899	1600
Average	5,364,713	1686

Initial Production rates (IP) were estimated for the base case at 3500 BOPD. Estimated ultimate recovery's (EUR's) associated with these IP's are based on field trend analysis and historic

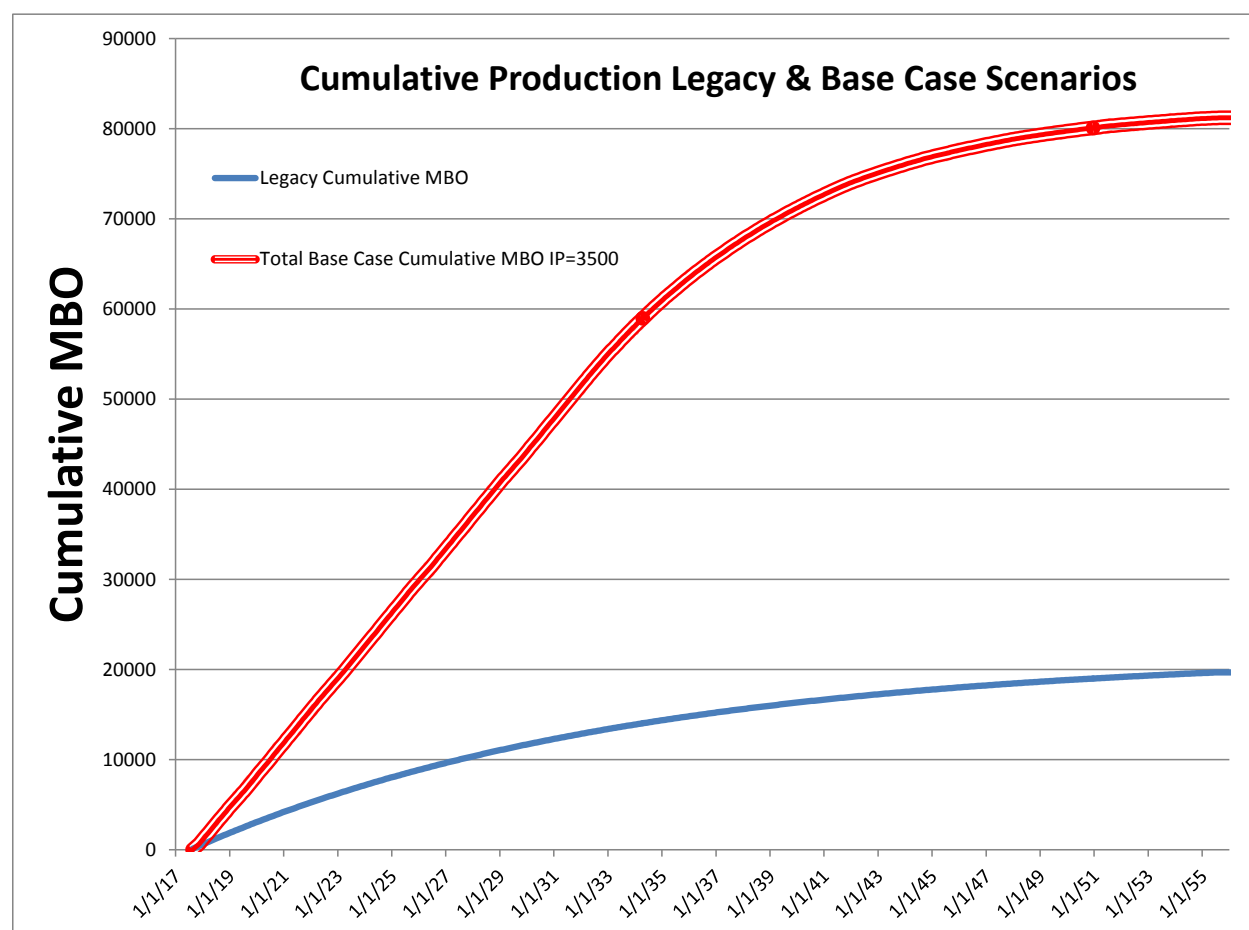
<sup>2</sup> Existing and prior-completed wells will be used for all extension wells. The "RD" suffix indicates the proposed "Re-drill Number" to be designated to the proposed Extension Wells. Extension Wells without an RD suffix indicate a wellbore for which the bottom-hole target will change lease location.

distributions. See Table 3.3-3 for estimates of ultimate recovery. Figure 3-1 presents this in a graphical format.

### 3: Table 3.3-3 Cumulative Production Estimates

	<u>Est. IP</u> <u>BOPD</u>	<u>Approximate Per</u> <u>Well Recoverable</u> <u>MMBO</u>	<u>Incremental w/6</u> <u>Well</u> <u>Development</u> <u>MMBO</u>	<u>Legacy</u> <u>Recoverable</u> <u>(As of</u> <u>8/2017)</u> <u>MMBO</u>	<u>Total</u> <u>Development</u> <u>MMBO</u>
<u>Base</u> <u>Case</u>	3,500	10	60	20	80

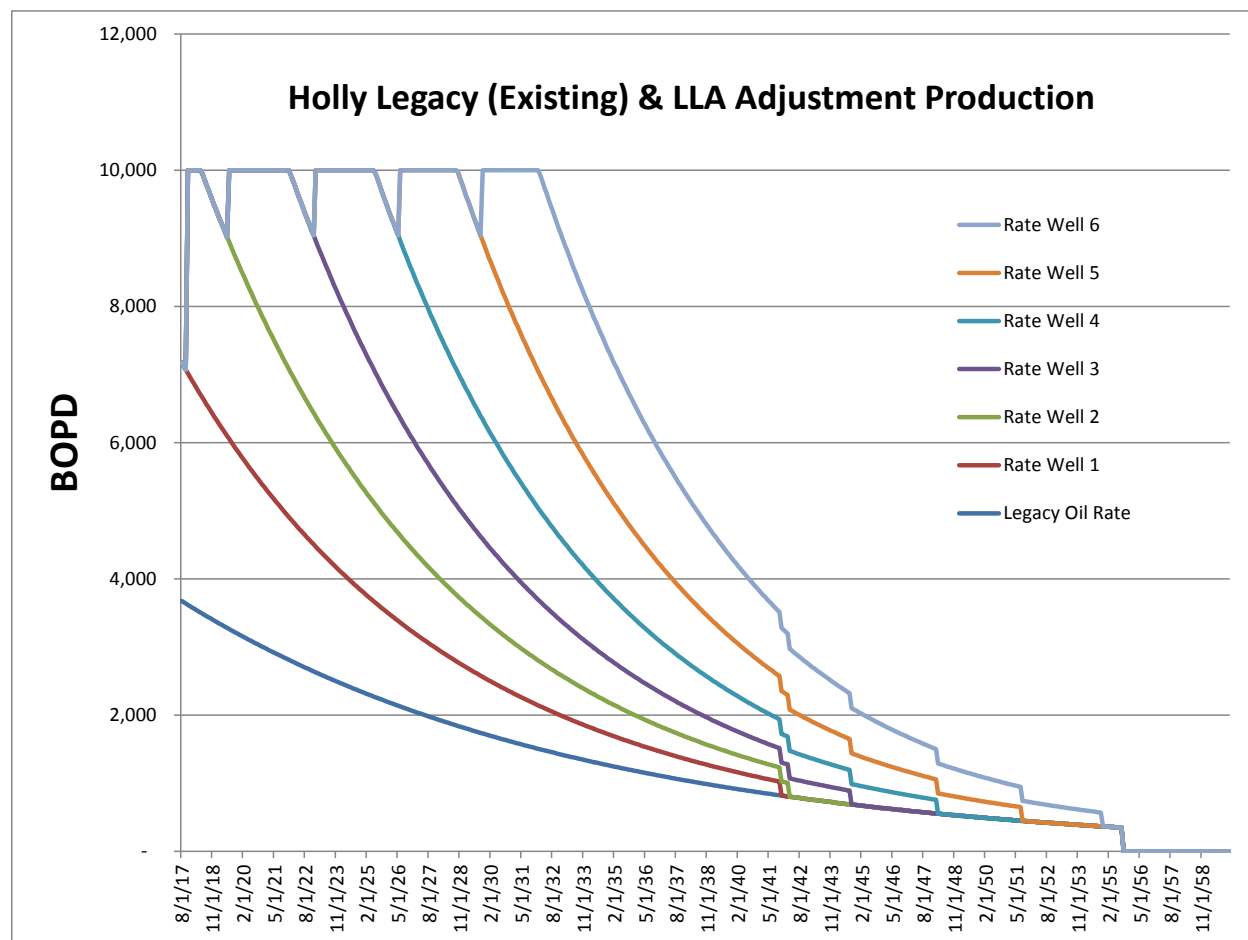
### 6: Figure 3.3-1 Cumulative Production Estimates



Initial development of the LLA adjustment area is assumed to begin in mid-2017, with 1<sup>st</sup> production from an LLA extended reach well beginning in August 2017. Existing well production (Legacy) is projected to be approximately 3,700 BOPD at that time. This rate assumption includes additional wells that are currently in our plan, prior to initiation of the LLA

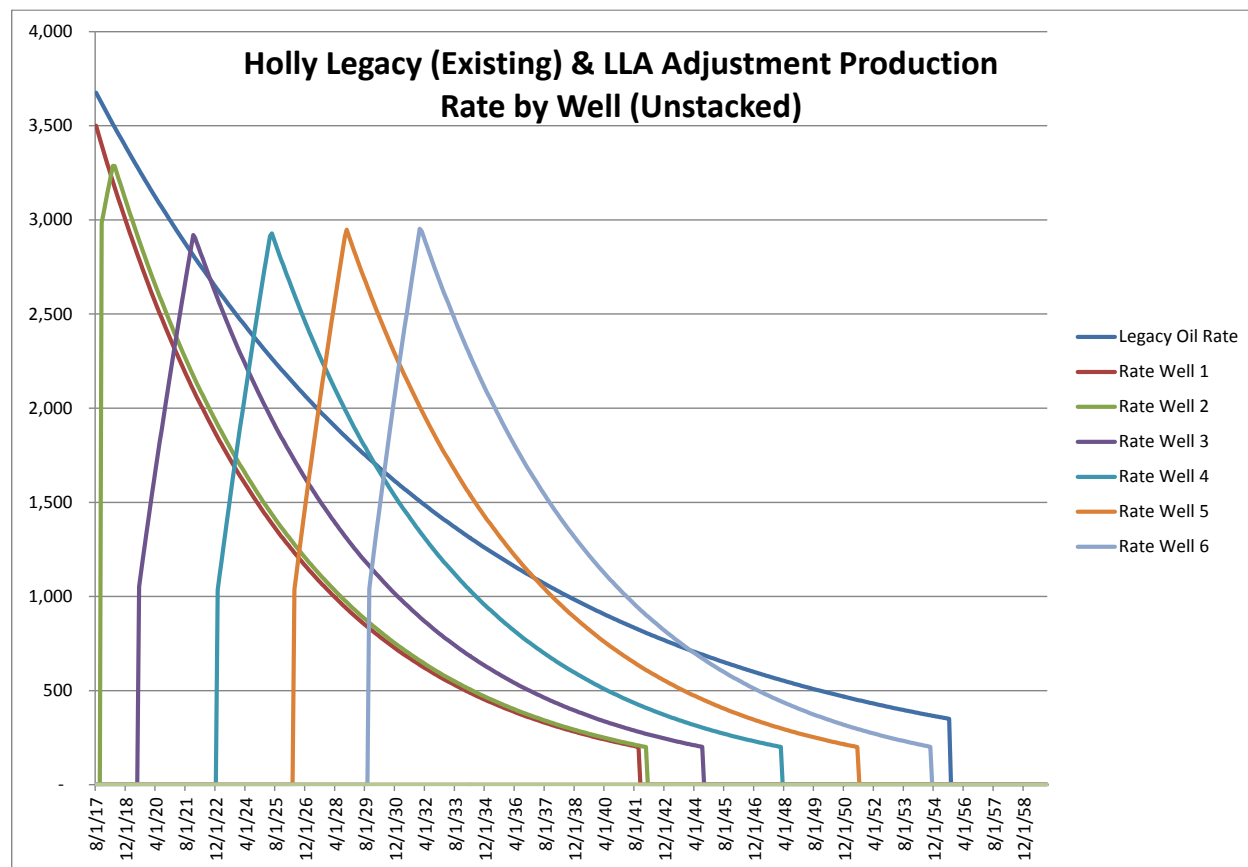
development activity. The oil facility capacity utilized for this profile is 10,000 BOPD. Additional wells are drilled and added to the program when facility capacity is in excess of 1,000 BOPD. Below is a stacked production plot of the oil gross rates utilizing the previously stated assumptions for IP and EUR.

7: Figure 3.3-2 Holly Legacy & LLA Production - Stacked



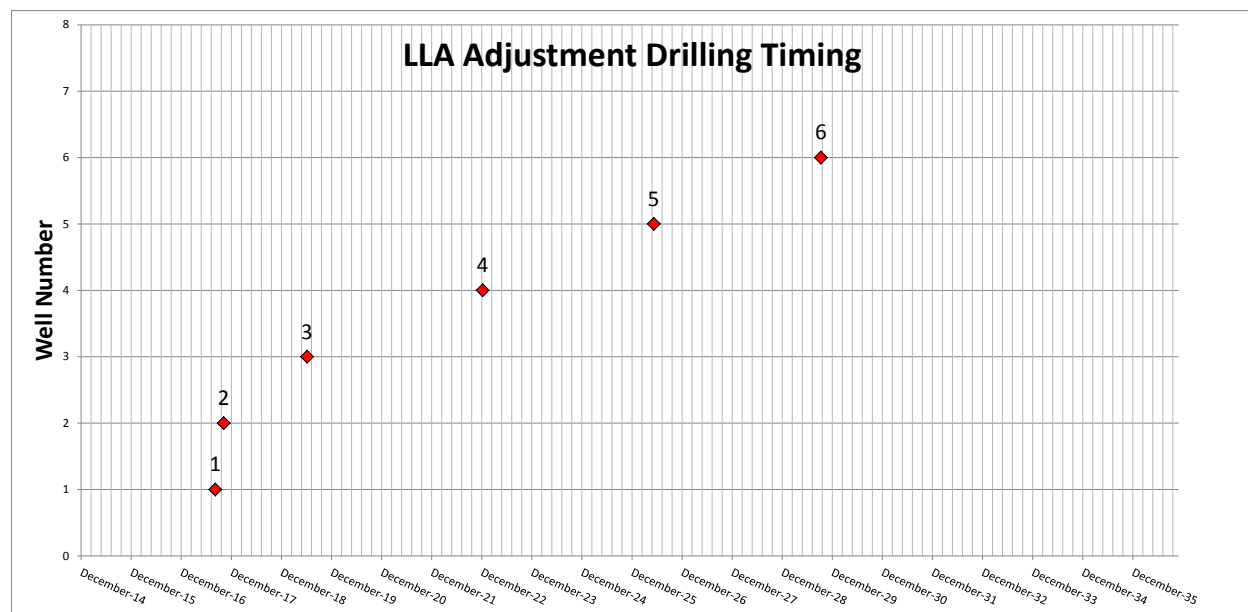
The plot below illustrates production performance from the “legacy wells” and the individual production rates of the 6 proposed wells over the life of the field.

**8: Figure 3.3-3 Holly Legacy & LLA Production - Unstacked**



The associated drilling schedule for the 6 above wells is presented below.

9 Figure 3.3-4 LLA Drilling Timing

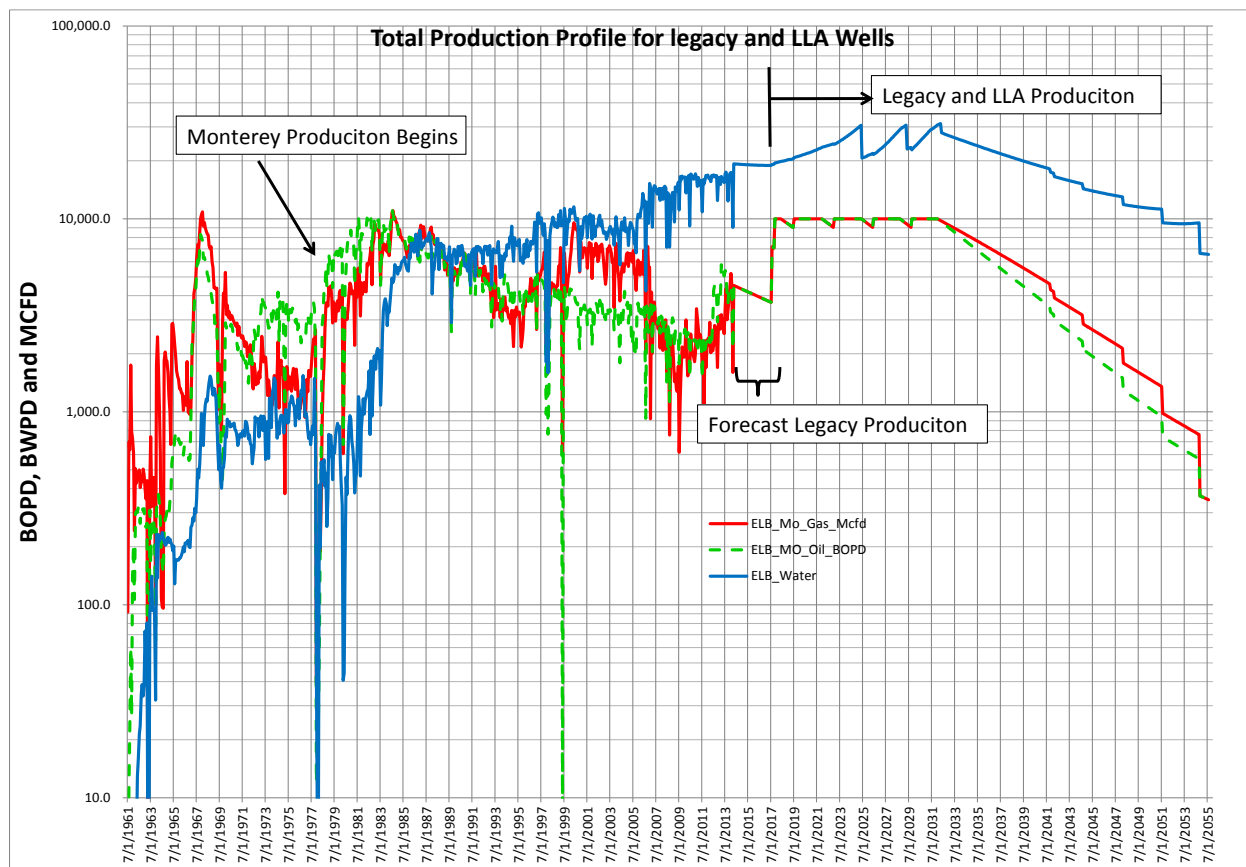


In addition to the above plots, a plot displaying historic production for the field, forecast production between year-end 2013 and in the beginning of the LLA development (8/2017), and total production for both legacy wells for the proposed 6 LLA wells for oil, gas and water is included below. Prior to late 1977, the majority of production came from Ricon and Vaqueros formations.

Some key features identified by the plot below are the following:

- Monterey drilling began in late 1976; however, it contributed little to the production profile at that time.
- By the end of 1978, approximately 10 wells had been completed in the Monterey formation in the field, signified by a significant increase in production.
- Additional development and infill drilling added approximately 2500 BOPD between mid-2012 and 2013.
- Production is expected to decline from approximately 4500 BOPD to approximately 3700 BOPD between the end of 2013 and the beginning of the LLA development program.

10 Figure 3.3-5 Holly Total Production Profile for Legacy &amp; LLA

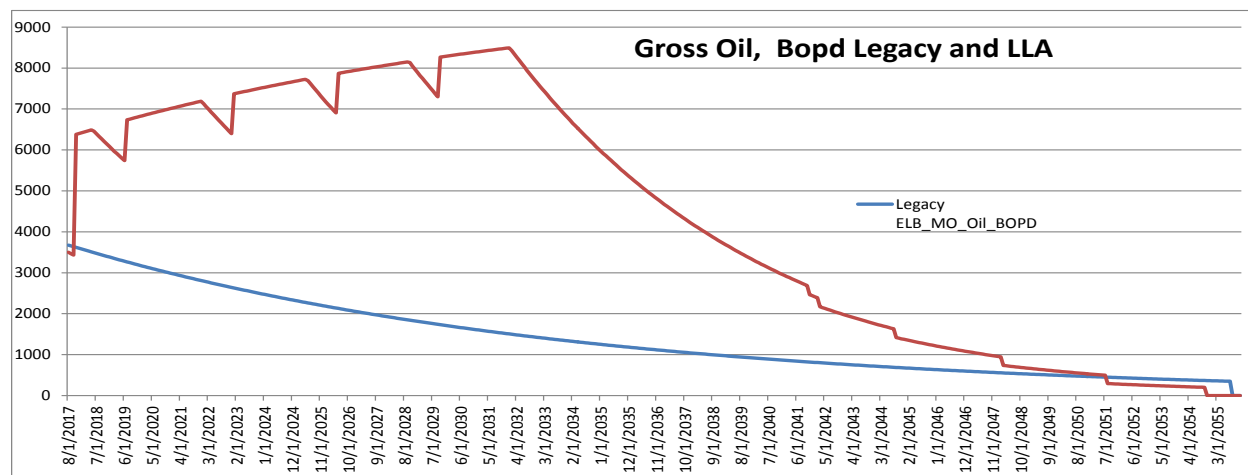


Assumptions for the above “forecast production profile” are as follows:

- Gas production during the producing life of the Monterey formation has averaged approximately 1000 GOR from 1977 to present.
  - Forecast gas production assumes the following:
    - 1000 GOR for the 1<sup>st</sup> 15 years (2017 until 2032).
    - Linear increase in GOR from 1000 to 2000 from 2032 until 2055.
      - Gas production is assumed to increase in the latter years for the LLA development because these wells will potentially be higher on structure.
- Forecast Water production is based on the historic water performance of the legacy Monterey wells, normalized to the LLA recoverable volume of 61.5 MMBO.
  - Periodically shut in high water cut wells (as exemplified in mid-2012 exhibiting a reduction of 5% water cut).
    - In the years 2025, 2029, 2032.
    - From 2032 until 2055 linear increase in water cut from 90% to 95%.

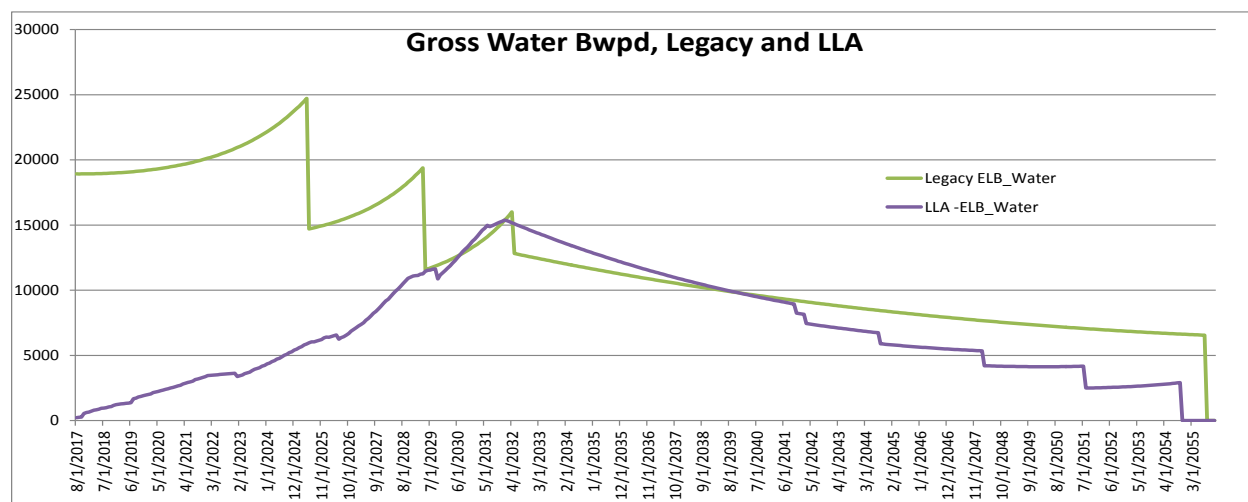
Production associated with the legacy wells and the LLA development is visualized from the following 3 plots. The 1<sup>st</sup> plot represents gross oil production, the 2<sup>nd</sup> plot represents gross water production and the 3<sup>rd</sup> plot represents gross gas production.

**11 Figure 3.3-6 Gross Oil – Legacy & LLA**

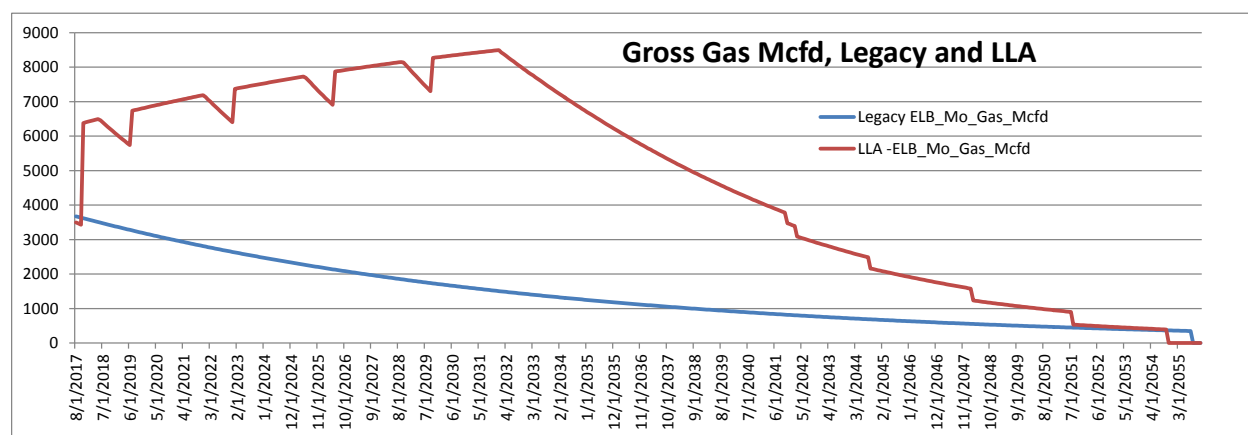




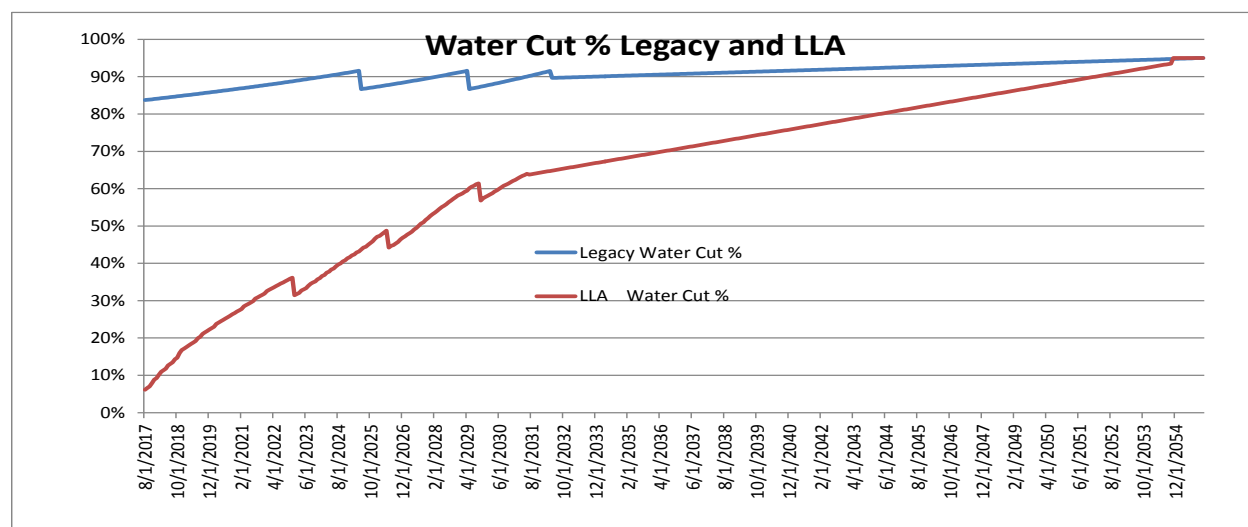
12 Figure 3.3-7 Gross Water – Legacy &amp; LLA



13 Figure 3.3-8 Gross Gas – Legacy &amp; LLA



14 Figure 3.3-9 Water Cut – Legacy &amp; LLA



### 3.4 PROGRAM COMPONENTS

#### 3.4.1 Adjustment of Existing Lease

The proposed program involves the adjustment of eastern boundary of existing Lease 3242.1. No new lease or extension of existing lease term is required for this program. The life of the South Ellwood oil field and its production facilities (Platform Holly and EOF) is a function of the size of the reservoir and the rate at which it can be economically developed.

A legal description of Venoco's proposed PRC 3242.1 adjusted easterly boundary follows. For clarity, the existing PRC 3242.1 is referred to as "Parcel 1" and the proposed extension area is referred to as "Parcel 2:"

*Parcel One: Being a portion of submerged tidelands in the Santa Barbara Channel, near Isla Vista, in Santa Barbara County, California, being further described as follows:*

*Commencing at a point on the Mean High Tide line of the above-mentioned Santa Barbara Channel, as determined from the Mean High Tide Line shown in Book 41, page 52, of Miscellaneous Maps and Book 55, page 87, Record of Surveys Records of Santa Barbara County, California, at the intersection with a North-South Grid line having a CCS27, Zone 5, coordinate of North 335,429.34 feet, East 1,433,532.48 feet, said point being the northeasterly corner of State Lands Commission, Oil and Gas Lease PRC 3242.1, said point also being the TRUE POINT OF BEGINNING of Parcel One (Existing PRC 3242.1 Lease), thence S 01° 04' 17" W a distance of 1974.77 feet along the east line of the above mentioned PRC 3242.1, to a point hereafter referred to as "Point A", said point "A" has a CCS27, Zone 5, coordinate North 333,454.91 feet, East 1,433,495.58 feet ; thence, continuing southerly along said east line of PRC 3242.1 S 01° 04' 17" W a distance of 10,253.17 feet to a point hereafter referred to as "Point B", said point has a CCS27, Zone 5, coordinate of North 323,203.52 feet, East 1,433,303.88 feet, thence, continuing southerly along said east line of PRC 3242.1 S 01° 04' 17" W a distance of 6256.12 feet to the southeast corner of said PRC 3242.1; thence, now leaving said east line, westerly along the California State Lands 3 Mile Limit Line to the southwest corner of said PRC 3242.1; thence north, along the west line of said PRC 3242.1 a distance of 21,673.38 feet to a point on the southeasterly line of PRC 421.1; thence along said southeasterly line of PRC 421.1; N 41° 12' 17" E a distance of 1016.36 feet to a point on said southeasterly line of PRC 421.1, said point is also the most northwesterly corner of said PRC 3242.1; thence southeasterly along said Mean High Tide line of the Santa Barbara Channel to the TRUE POINT OF BEGINNING of Parcel One.*

*Parcel One includes an area of approximately 4,290 acres.*

*Parcel Two: Also being a portion of submerged tidelands in the Santa Barbara Channel, near Isla Vista, in Santa Barbara County, California, being further described as follows:*

*Continuing from said "Point A" as hereinabove described, said point being the TRUE POINT OF BEGINNING of Parcel Two (PRC 3242.1 Lease Extension Parcel); thence S 71° 28' 38" E a distance of 18,425.93 feet; thence S 00° 03' 02" W a distance of 10,213.31 feet; thence S 89°*

59' 34" w a distance of 17,780.94' feet; to said "Point B" as hereinabove described, said point is on the east line of said PRC 3242.1; thence N 01° 04' 17" E a distance of 16,071.99' feet, along the said east line of PRC 3242.1 to the TRUE POINT OF BEGINNING of Parcel Two.

Parcel Two includes an area on approximately 5327.30 acres.

Bearings and distances herein are CCS27 Zone 5.

### 3.4.2 Slot Utilization

Venoco is proposing to change the bottom -hole location of six existing wells on Platform Holly. These six existing wells will be extended into the adjusted lease area of PRC 3242.1 into areas with significant remaining oil in place (i.e. continuation along trend of the structurally higher portions of the field). These wells will add increment reserves and more efficiently develop along the existing eastern border of 3242.1 lease.

Table 3.3-2 lists these wells and the coordinates for the proposed bottom-hole locations.

**4: Table 3.4.1 Platform Holly, South Ellwood Field Proposed New Bottom-Hole Locations (BHL) for Extension Wells**

Extension Well #	Well No.	Original Well No. & API#	New BHL (NAD27) Easting	New BHL (NAD27) Northing	Z (subsea) of lateral	Length of re-drilled well (completion length)
1	3242-3RD2	3242-3RD1 04-283-00005-01	1438403	325552	-3,930'	15,809' (4,000')
2	3242-6RD1	3242-6 04-283-20065	1438459	324076	-4,100'	16,250' (4,000')
3	3242-11RD1	3242-11 04-283-20286	1438505	326841	-4,200'	15,361' (4,000')
4	3242-21	3120-7RD3 04-283-20060-03	1445056	322906	-3,979'	22,657' (6,000')
5	3242-22	3120-13 04-283-20278	1445100	324072	-4,000'	22,926' (6,000')
6	3242-23	3120-10 04-283-20276	1438572	329551	-4,175'	15,236' (3,500')

### 3.4.3 Drilling and Completion Activities

Prior to re-drilling the wells, the existing well bores to be used will be abandoned and plugged with cement. Depending on the well, either a whipstock will be set and a window milled or the inner casing will be cut and recovered to a depth above which the new drilling will kick off. California State Lands Commission (CSLC) and Division of Oil, Gas, and Geothermal

Resources (DOGGR) staffs will approve the abandonment procedures for each well before where the re-drill will begin. DOGGR will witness and approve these activities.

Each well will then be directionally drilled to its new bottom-hole location. Utilizing a top drive unit for drilling will allow the use of longer stands of pipe, which results in less time required to drill each well; and allows rotating the drill pipe as it is run or removed from the well. This provides a safer and more efficient drilling operation, and will reduce the drilling time of each well over conventional methods. Both cellulose/seawater based and mineral oil based mud systems are planned to be used to drill to the target bottom-hole location. The use of mineral oil-based muds is allowed by the CSLC and Regional Water Quality Control Board (RWQCB). However, pursuant to current CSLC policy, no muds and cuttings from the development of State Tidelands can be discharged into marine waters and must be either injected or transported to shore.

For all six proposed re-drills, an intermediate casing string will be set at the top of the Monterey formation (the casing shoe will be in the Lower Sisquoc). For all six of these wells, the Monterey will then be drilled and completed with a cemented liner set at the base of the productive zone. A cellulose/seawater based mud system will most likely be used to drill the production section of the well.

The "pipes" extending from the platform down to the seafloor are called conductors. These are the largest, outermost string of casing that extend into the subsurface. The conductor casings are not in contact with the production casing and are not subject to pressure, drilling operations, or production materials. They amount to a "protective sheath" around the well casing and production pipe and Venoco plans to keep all plugging and cut and recover operations at depths below the conductors. These conductors are included in the overall cathodic protection and corrosion control & prevention system used on State (and all) platforms.

The competency of the well bore casing (inside of the conductors) is hydrostatically tested to a working pressure as stated in the individual well plan and as reviewed and approved by DOGGR and CSLC.

#### Well Lift Method

It is expected that a combination of Gas Lift production and Electrical Submersible Pumps (ESPs) will be required in order to fully produce this reservoir.

Gas Lift production is basically accomplished by the injection of produced gas downhole into the annular space through an orifice and into the tubing. As the injected gas rises in the tubing, it will lift oil and water up to the surface, where the oil may be separated for further processing. A pre-determined amount of the produced gas is selected for re-injection into the well for continuing the gas lift process.

ESP production relies upon the use of downhole electrical pumps, which operate off of electricity to pump the fluid to the surface.

We anticipate initial production to be made using gas lift (utilizing existing gas-lift supply on the platform) with eventual conversion to ESPs as the production declines. It is expected that each well will utilize gas lift for a minimum of 2 to 5 years before conversion to ESP.

#### Hydraulic Fracturing (“Fracking”)

The Monterey reservoir of interest for this Program is naturally fractured. No fracking will be performed as part of this project. Any well completion activity will comply with all existing regulations including SB4 interim regulations, when enacted.

### **3.4.4      Drilling Fluids and Disposal**

Platform Holly presently operates and will continue to operate in a zero discharge mode, therefore no wastes (including drill mud, drill cuttings, or produced water) are discharged to the ocean. This is consistent with current re-drill activity at Platform Holly.

While drilling, it is expected that drilling activity will generate an average of 40 bbls of cuttings per day, and 220 bbls of slurrified mud and cuttings per day. For a 15,000’ measured depth well this translates to 16,500 bbls of slurrified drilling waste; for a 23,000’ measured well this translates to 21,500 bbls of slurrified drilling waste.

Venoco is proposing to grind the produced cuttings and dispose of these cuttings by injection into an approved Class II disposal well on the platform or transport to shore for proper disposal. Due to the relatively high economic value of mineral oil based muds, if mineral oil based muds are used, Venoco plans to ship the mud back to the vendor for recycling (if not recycled, they would be injected with the other mud and cuttings).

For the cuttings injection, Venoco will use an electric cuttings injection system to grind the cuttings prior to injection. Wells intended to be used for cuttings injection and previously reviewed by CSLC for such use include existing wells 3242-17 and 3120-4.

Prior to utilizing any well for cuttings injection, a Mechanical Integrity Test will be performed initially as well as after every 15,000 bbls of fluid injected (including slurrified waste and pre/post flush volumes).

Formal approval from DOGGR for the use of this injection well for this program will be obtained prior to commencement of drilling.

At its option, Venoco may elect to transport mud cuttings to shore for shore-side recycling or disposal.

### 3.4.5 Equipment and Personnel

Venoco proposes to use existing and additional temporary equipment to conduct the re-drilling operations (Tables 3.4-2 & 3). A detailed description of Platform Holly and its associated equipment is provided in Section 4. Air emission estimates for the equipment to be used for this program are provided in Section 5.

**5: Table 3.4-2 Existing Equipment**

<b>Existing Equipment</b>
Crane, ICE powered
Drilling Rig SCR House
Drilling Rig 600 VAC Transformer and Shore Power Tie-In
Drilling Rig
(3) Natural Gas Powered Rig Generators
Drawworks with (2) 1222 HP motors
27.5" Rotary Table
Choke Manifold
Jacking System

**6: Table 3.4-3 Rental & Temporary Equipment**

<b>Rental &amp; Temporary Equipment</b>
Electric Wire Line Unit
Hydraulic Unit for Casing Tongs – Electrically Powered
Tubing Unit – Electrically Powered
Hawk-Jaw Pipe Make-Up Unit (Electrically Powered)
13-5/8" BOP (Annular, Double Gate, Mud Cross)
Electric Top Drive Unit (To permit longer stands of drill pipe, and to rotate pipe as it is removed from hole, providing greater control)
Electric Top Drive Control House
Top Drive Torque Tube (attached to Drilling Rig Mast)
Electric Cement Unit – For plugging the abandoned old wells and cementing the annulus of the new wells
Electric Cuttings Injection System – (For grinding cuttings prior to

injection). Consists of mud cleaner, (2) qty shakers, augur, strainer, 60 HP Charge Pump, 250 HP Injection Pump, 256 HP Grinder, Course Tank, Classifying Tank
Logging Unit: (Utilized as needed) Consists of Logging Cab, Cable Module, Tool Pallet, Work Station, Power Box, Satellite Box, and Rig Floor Box.
Pipe Storage Rack (to provide temporary lay-down space to store drilling pipe and casing)
Mud Pumps (Upgrade existing 1,000 HP mud pumps (2 qty) to 1,600 HP mud pumps (2 qty)
Active mud tank (340 Bbls)
Reserve Mud Tank (500 Bbls)

Power for the electrical drilling equipment will be provided by the existing natural gas powered generators as well as the existing subsea power cable from shore. Three generators are on the platform and used to support drilling. The drilling rig power loads are very cyclic depending on the nature of the activity. Certain components of the rig with relatively constant loads will be configured so that they can be fed from either rig power (generators) or from platform power (from shore cable).

Platform Holly has operators on board 24 hours per day, 7 days per week. Operators work 12-hour shifts (with an additional hour for commute time) on a 7-day on/7-day off rotation. In addition, maintenance personnel for operation and well maintenance are utilized as needed. During rig operations, additional personnel are typically required. Under normal operations, personnel do not sleep on the platform.

The number of personnel necessary to conduct this work will be similar to those needed for well workovers periodically conducted as part of the normal operations on the platform. Specifically, those would include approximately 18 additional people at one time (per shift) on Platform Holly during the drilling activity of the proposed program.

Consistent with existing operations personnel reporting to Holly will arrive and, if applicable, park their vehicles at the Ellwood Pier, located approximately 1/2-mile west of the EOF. Venoco expects that crews for this re-drilling program will be transported via the normally scheduled crew boat trips that support normal operations on the platform. The only circumstance where special trips might be needed is if the timing of the arrival of an individual with special expertise (e.g., a mud expert) does not correspond to scheduled trips. Ordinarily, scheduled trips are frequent enough to obviate the need for special trips.

### **3.4.6      Support Operations – Small Item Delivery and Crew Changes**

Crew changes and delivery of small supplies in support of the re-drill program will be via the crew boat that normally makes scheduled runs between the Ellwood Pier and Platform Holly. The frequency of trips can vary, but typically makes three to five trips per day, and is always available in case of emergency. All support boat activities will be conducted within currently approved Platform Holly permits. The program will not result in any changes in the permitted operations at EOF.

### **3.4.7      Support Operations – Supply boat**

To support re-drilling of the extension wells, and to minimize possible drilling interruptions due to weather delays affecting delivery of material, it is proposed to utilize a supply boat.

Supply boats of this class are typically chartered many months in advance. At this time, it is not possible to identify the specific vessel that would be used; but Venoco's intent is to utilize a workboat which is presently listed or one comparable to those listed on the current *Boat Monitoring and Reporting Plan*; and to manage engine/fuel use such that any emissions associated with workboat usage remain below the baseline emission limits. For purposes of quantifying estimated emissions, engine and fuel consumption data for two existing vessels<sup>3</sup> presently working in the Santa Barbara Channel were used.

No anchor deployments are required. Existing moorings will be used. At this time, there are no known issues with the existing mooring system; but once a workboat is selected the existing mooring system will be reviewed for use with the selected vessel. A copy of the analysis will be provided to CSLC for review and approval.

The duty cycle and frequency of resupply trips can vary, but for impact calculation purposes Venoco is proposing an estimated frequency of 4 runs per week.

### **3.4.8      Support Operations – Temporary Pipe Rack**

The available deck space aboard Holly for staging drill pipe and casing is limited. In addition, due to the drilling rig configuration, depending upon where the rig is spotted pipe often has to be stored in a North-South orientation; but lifted and swung into an East-West alignment in order to be brought into the rig through the V-Door.

To provide for additional pipe storage; as well as the ability to stage pipe in proper alignment for use by the drilling rig it is proposed to build a temporary pipe rack on the drill deck. This would increase the efficiency of crane use when handling drilling pipe, and reduce crane fuel consumption.

The pipe rack will consist of steel framing members attached to the drilling deck; and a combination of grating and steel plate covering which provides the actual storage surface for the

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<sup>3</sup> Tidewater vessels "Admiral Tide" and "War Admiral"

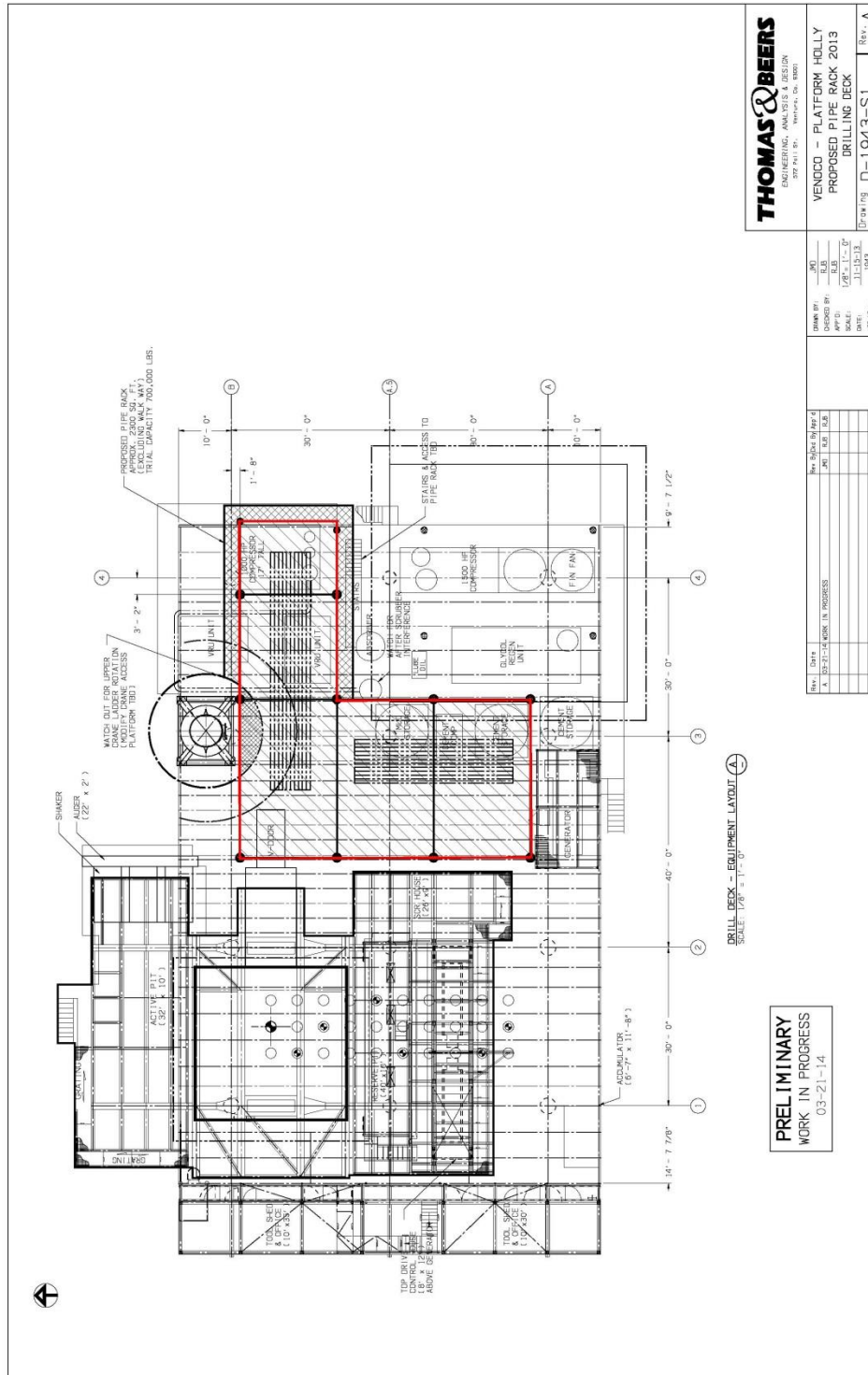


pipe. The approximate surface area of the pipe rack would be approximately 1,350 square feet. The surface will incorporate wood sleepers for the pipe to rest upon. The height of the pipe rack floor would be approximately 21' above the drill deck.

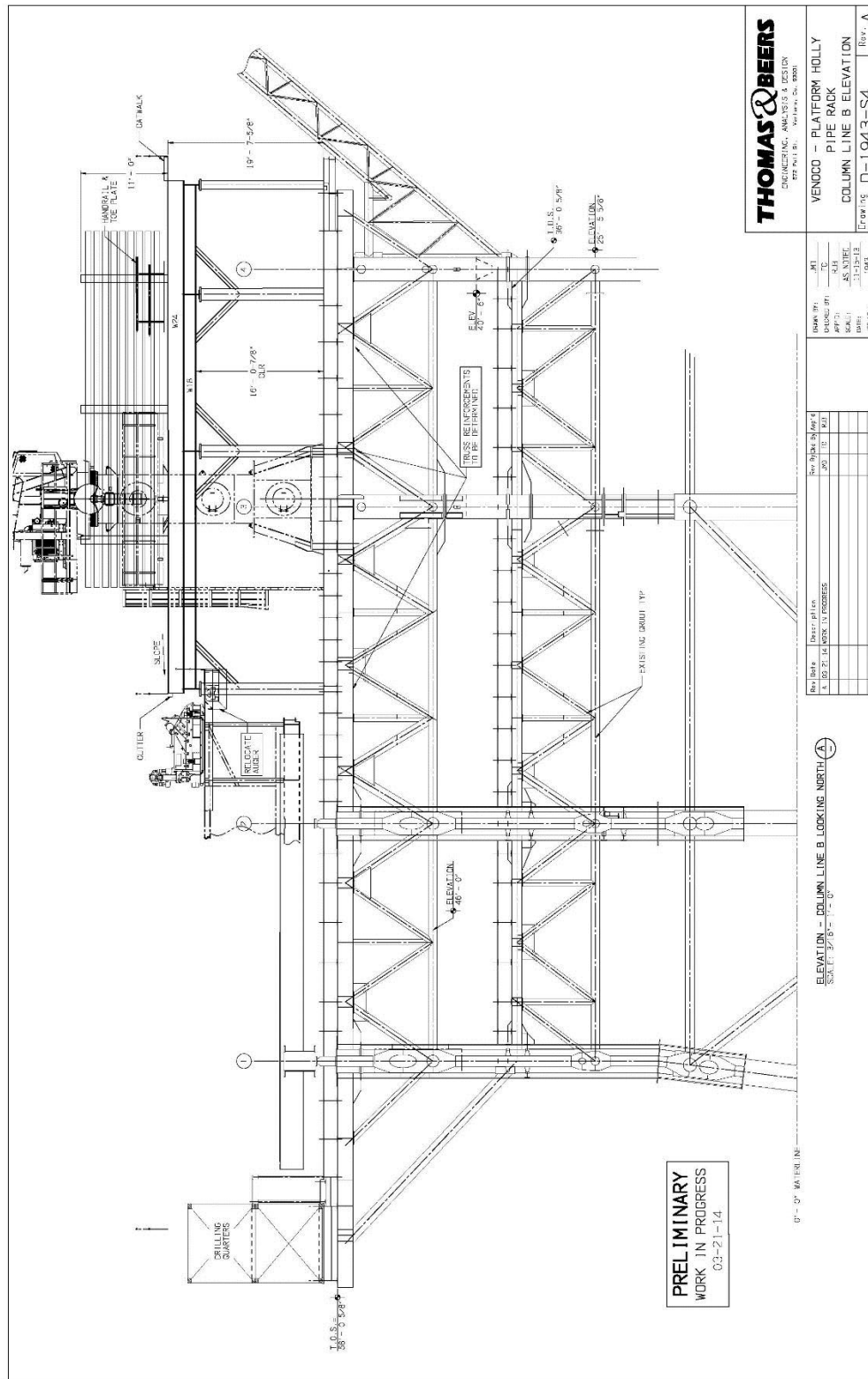
To permit access to existing production equipment as well as drilling support equipment located beneath the rack, the structure will be designed with large removable sections of grating which can be lifted and stowed while accessing equipment beneath.

Figures 3.4-1 and 3.4-2 provide plan and elevation views of what the pipe rack would look like.

15: Figure 3.4-1 New Pipe Rack Plan View



16: Figure 3.4-2 New Pipe Rack Elevation View



### 3.4.9 Schedule

After engineering review and approval of the temporary pipe rack, it is estimated that the majority of the temporary pipe rack would be fabricated in a shop yard off-site; and designed to be transported to Platform Holly in modular sections. The off-site fabrication is expected to take approximately 90 days, working daylight hours 5 days a week.

Once ready for offshore installation, the temporary pipe rack pieces would be shipped as desired for assembly. Once on-site, the rack would be attached to the platform, along with handrails and access ladders. Work would be carried out using daylight shifts, 5 days per week. The offshore installation component of this program is expected to take 3 months.

After the temporary pipe rack is installed, the rig will be prepped for drilling. It will take approximately 10 days to mobilize equipment and prepare the rig for operations. This work will also include the staging of rental rig support equipment beneath the temporary pipe rack. Once the equipment required is on board and rigged up, each well's current bottom-hole completion will be pulled and the lower section of each well plugged and abandoned per DOGGR and CSLC regulations. From there, the well will be cut & recovered back to the required depth, re-drilled, completed, and tested. After the conclusion of completion operations, it will take approximately 10 days to demobilize drilling and completion equipment and idle the rig.

“Shorter” 15,000’ to 17,000’ LLA Wells (4 Qty):

- Cut & Recover / Abandonment = 30 Days
- Drilling Intermediate Hole = 18 Days
- Casing Intermediate Hole = 7 Days
- Cementing Intermediate Hole = 2 Days
- Drilling Production Hole = 22 Days
- Casing Production Hole = 8 Days
- Cementing Production Hole = 2 Days
- Completing Well = 25 Days
- **TOTAL OPERATIONAL DAYS = 114 Days**

“Longer” 20,000’ to 23,000’ LLA Wells (2 Qty):

- Cut & Recover / Abandonment = 30 Days
- Drilling Intermediate Hole = 22 Days
- Casing Intermediate Hole = 9 Days
- Cementing Intermediate Hole = 2 Days
- Drilling Production Hole = 26 Days
- Casing Production Hole = 10 Days
- Cementing Production Hole = 2 Days
- Completing Well = 30 Days
- **TOTAL OPERATIONAL DAYS = 131 Days**

It is planned to drill the first well in 2017; the second well in 2018; the third well in 2019; the fourth well in 2023; the fifth well in 2026; and the final well in 2030.

## S E C T I O N 4

## Existing Facilities

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### 4.1 PLATFORM HOLLY

Platform Holly is a self-contained, triple-decked, oil drilling and production platform. Production and control equipment, drilling systems and living quarters have all been revamped in recent years. The platform sits in about 211 feet of water. The boat landing on the platform is at approximately 14 feet and a heliport pad is at approximately 81 feet above sea level. 30 well slots exist on the platform. The platform produces oil/water emulsion and natural gas that are separately transported via subsea pipelines to the EOF. Some or all of the water in the oil/emulsion is currently separated on the platform and re-injected into the Monterey formation via water injection wells. The gas is compressed and dehydrated on the platform.

Production rate on the platform has reached as high as 17,000 bbls of wet emulsion (11,000 bbls of oil and 6,000 bbls of water) per day. Platform Holly is currently permitted at a production rate of 20,000 bbls of oil emulsion per day and 20,000 MCFD gas. Current production on the Platform which is presently shipped to shore is approximately 4,200 bbls of oil per day, 3,500 bbls of water per day and 2,500 MCFD of gas.

Produced gas is transported to shore via a 6-inch diameter subsea pipeline that is currently rated for an operating pressure of 650 psig, and currently operates at a pressure of 110-160 psig. The oil/water emulsion is transported through a separate 6-inch diameter subsea pipeline that is currently rated for an operating pressure of 650 psig and presently operates at 150 psig. The average hourly flow rate is 320 BPH. At 13,000 BPD Oil production, with an estimated 35% water cut coming to shore, total flow would be 20,000 BPD (833 BPH) emulsion with an estimated pipeline pressure of 300 psig at Platform Holly.

Of the thirty wells on Platform Holly, two are for gas injection and production, three are for produced water injection, one is for drill cuttings injection, and one is temporarily abandoned. The remaining wells are either producing or temporarily out of service. The number of producing and idle wells will change over time based upon well workover programs and reservoir characteristics. Well operations change as needs change; for example, at some time in the life of the platform, all 30 wells were producing. The producing wells currently draw primarily from the Monterey and Rincon formations. The gas injection wells are completed in the Rincon formation. The primary operations on Platform Holly are drilling, production, well maintenance and workover operations, oil, water and gas separation, emulsion shipping, vapor recovery, and gas compression and shipping, gas dehydration, and gas lift compression.

It is estimated that 3 – 5 water injection wells will be necessary to accommodate the approximately 30 MBW/D peak water production rates. Currently, we inject approximately 20 MBW/D into 3 injection wells. Over time, legacy wells (on the 3120 and 3242 leases) will be

abandoned and located in optimal positions for both water disposal and water support operations. Depending on the well/location identified, it is estimated that injection rates up to 10 MBW/D can be accommodated. This is demonstrated by the deliverability of wells such as the 3242 – 18 that have produced total fluid rates approaching 10 MB/D.

At the current time, it is assumed that all produced gas from the LLA development will be processed and sold. We estimate that approximately 10 MMCFD will be produced between 2017 and 2032. Gas from the South Ellwood field yields approximately 140 barrels of liquids per MMCF of gas. It is anticipated that this quantity of gas will be processed and that an additional 1400 BBL's/D can be delivered from the field.

The crude oil produced aboard Holly typically has a Specific Gravity (SG) of 0.92 to 0.93, and API Gravity of 20-22. The untreated gas which is produced typically has a thermal value of 1100-1120 BTU/cubic foot, with a carbon dioxide (CO<sub>2</sub>) concentration of 20 percent and hydrogen sulfide (H<sub>2</sub>S) concentration of 18,000 parts per million on volumetric basis (ppmv).

## **4.2 OFFSHORE PRODUCTION**

Cumulative production from Platform Holly since it was set in 1966 has been 75.2 million standard barrels (MMSTB) of oil (from all reservoirs) and 78.2 billion standard cubic feet (BCF) of gas, as of January 31, 2014. Oil/water emulsion and natural gas are produced from the reservoir via the wellbores, to the surface through a small diameter pipe, known as tubing. Wellheads and valves sit atop the tubing strings (aboard Platform Holly) to contain and control the flow of well fluids to downstream treating equipment. Platform Holly wells are not normally capable of natural flow and are produced either using Electric Submersible Pumps (ESPs), which are small electrical pumps installed directly into the well bore, or using Gas Lift, where lift gas which is injected into the tubing at various subsurface depths to assist in “lifting” the oil/water emulsion to the platform also flows up the tubing string. The actual method used to provide for lifting fluids to the surface may change over the life of the well.

## **4.3 PLATFORM RIG**

Well maintenance and workover operations (including re-drilling) are periodically required in order to sustain production from the wells. The existing platform rig is used for maintenance (workovers) as well as drilling operations. The rig is self-contained and includes a box-on-box substructure, a derrick capable of pulling triple stands of tubing, a silicon controlled rectifier (SCR) house, two mud pumps, and two mud tanks. Well maintenance may also be performed with coiled tubing or portable slick-line wireline units.

Venoco has performed a Mechanical Feasibility Review of proposed “extended reach” wells. The modeling included preparation of Torque and Drag (T&D) curves and simulated the drilling of a 24,936' Measured Depth extended reach well from Platform Holly to the furthest easterly edge of the South Ellwood Structure; and fairly represents a “worst case” well model. In order to evaluate “worst case” rig pull requirements, four sequential drilling events were modeled to define the actual expected operating drilling envelope for greatest tensile load requirements on the rig and thereby the estimated maximum platform loading during a worst

case drilling scenario. The model well drilling envelope is greater than each of the proposed six wells to be drilled. For all cases the worst case maximum tensile string pull was 400,000#s. When adjusted with top drive and block weight, as well as overpull safety factors, the maximum loading for the rig is calculated to be 605,000 #s. This is within the defined hook load capacity for the rig.

#### **4.4 PRIMARY AND TEST SEPARATION**

Oil/water emulsion and gas from the production headers is commingled into one stream and directed through a series of vessels for processing. The primary vessels for handling this stream are:

- V-107 production separator
- V-108 production separator
- V-106 test separator
- V-109 water surge drum
- V-110 oil surge drum
- ET-150 oil dehydrator

Platform Holly utilizes two parallel 3-phase separators (V-107 & V-108) for initial phase separation. The production separators operate in parallel and separate natural gas and some water from the oil/water emulsion from the producing wells. Each separator is designed to process up to 20,000 BPD oil/water emulsion and 14,000 MSCFD produced gas, for a total 40,000 BPD oil/water emulsion and 28,000 MSCFD produced gas. The oil dehydrator may be used to further dry the oil before it leaves the platform. “Wet oil” from these 3-phase separators is shipped to EOF via the Holly oil pipeline, permitted for up to 20,000 BPD throughput. Free water from the 3-phase separators and the oil dehydrator (ET-150) flows to the water surge drum, (V-109) which is designed for 22,000 BPD water throughput. Water pumped from the water surge drum is delivered to water injection wells on Holly.

The test separator (V-106) is used normally with one producing well at a time, in order to determine the amount of fluids any particular well produces.

At the EOF, final oil polishing occurs, with any remaining water recovered disposed of via existing wastewater injection well WD-1. Sales oil is metered and shipped out using Line 96 into the Plains All American Pipeline (PAAPL) System. Line 96 is capable of handling 20,000 BPD of crude oil, which is more than enough for all proposed Venoco production projects.



## **4.5 VAPOR RECOVERY**

A vapor recovery system collects natural gas vapors from various sources at low pressure and compresses the gas so that it can be combined with the natural gas production stream. Low-pressure gas streams collected by the Vapor Recovery Unit (VRU) system include annulus (casing) gas, emulsion surge tank vapors, and glycol still vapors.

## **4.6 GAS COMPRESSION AND DEHYDRATION**

Natural gas is collected from the primary separators and from vapor recovery sources, and routed to a glycol absorption treatment system, to remove water. This water extraction is known as dehydration. Some of this gas flow is then routed into the gas pipeline to shore for treating at the EOF and sold to The Gas Company through an existing Gas Company sales pipeline. The rest of the gas is compressed further for use as lift gas, or re-injection into the reservoir.

## **4.7 UTILITY AND ELECTRICAL SYSTEMS**

Fresh water is loaded into portable water “tote” tanks on an as-needed basis and transported to the Platform during regularly scheduled crewboat runs. Present water consumption averages about 18,000 gallons per month.

Electrical power is provided to the platform by means of a high voltage submarine cable, which is tied into the SCE system onshore. The cable operates at 16.5 kV (nominal), and was installed (replacing an older cable) in 2013. Electrical distribution equipment on the platform consists of two main power transformers that reduce the voltage to 2,400 volts and 480 volts, respectively. In addition, there is a transformer used to provide 600 VAC power to support drilling rig and associated equipment. Platform Holly currently consumes approximately 2,646 kilowatts (kW) of power.

## **4.8 POLLUTION PREVENTION AND SAFETY SYSTEMS**

All hydrocarbon handling equipment is designed and operated to prevent pollution. Maintenance or repair of equipment necessary to prevent pollution of offshore waters is undertaken immediately. The platform is outfitted with strategically located shutdown switches and alarms. All control valves on the oil wells are actuated either pneumatically or hydraulically so that all valves will close when instrument air pressure is suddenly reduced.

All safety systems on Platform Holly are designed to meet the current American Petroleum Institutes’ (API) API-14C Recommended Practices for Offshore Oil and Gas Production Facilities.

All safety shut-in devices are tested monthly in the presence of California State Lands Commission (SLC) staff and quarterly in the presence of California Division of Oil, Gas and Geothermal Resources (DOGGR) representatives.

All production facilities are included as part of the Inspection and Maintenance (I&M) Program. The I&M program includes a visual inspection of all components every 12 hours. Pumps, compressors, and previous leak sites are inspected monthly. Accessible components and transfer

units in light hydrocarbon service are tested with an organic vapor analyzer (OVA) every 3 months. All other components are tested similarly, annually.

All platform decks are equipped with curbs, gutters, drip pans, and drains to collect all free liquids, including rainwater. Deck drains lead to a sump tank located underneath the production deck from which water is pumped into the process for transport to the EOF for separation and disposal. A visual inspection of the ocean water around the perimeter of the platform is conducted daily and recorded.

Venoco's Oil Spill Contingency Plans, Hazardous Materials Business Plan, Emergency Action Plan, and Spill Prevention, Control, and Countermeasure [SPCC] Plan have been developed and fully comply with the Federal, State and local regulations and requirements. The Plans include a written commitment of manpower, equipment and materials, clear notification procedures with current personnel contacts, a list of available resources for clean-up and control, and immediate response procedures for both major and minor spills. The Plans are updated and approved as required by applicable regulating agencies. Current copies of the Plans are on file at the facility and with USCG, BOEMRE, State Fish & Game OSPR, County of Santa Barbara, SLC and DOGGR.

The training of both Venoco's Facility Initial Incident Response Team and management level Sustained Incident Response Team in the prompt and effective response to an emergency incident is an integral part of Venoco's environmental, health, and safety policies. The training program consists of classroom instruction, field briefings, and annual exercises, monthly safety drills and semi-annual drills involving the deployment of response equipment. The training also includes field exercises with Venoco's Oil Spill Response Organization - Clean Seas and other spill response contractors. Detailed descriptions of the training provided for both the Initial Incident Response Team and the Sustained Incident Response Team are documented in the Oil Spill Contingency Plan and Emergency Action Plan.

As appropriate for their position, facility personnel are trained in the operation and maintenance of oil spill prevention equipment and are made aware of the requirements of the applicable pollution control laws, rules, and regulations. All personnel are trained to at least the Hazwoper Responder Level, additionally Qualified Individuals (Incident Commanders) are certified in accordance with Hazwoper, Federal and State requirements. Environmental, health, and safety meetings are conducted daily for facility personnel, and additionally as necessary depending on projects and jobs occurring daily. All personnel are required to attend semi-annual block training to satisfy company and regulatory required safety training. Personnel are trained on the SPCC Plan at least annually, and more frequently if necessary. Personnel attending this training include all operators, foremen, management, and environmental staff. The refresher training reviews the purpose and scope of the SPCC and each person's role in spill prevention, control, and cleanup. The review includes discussions of any recent spill events, malfunctions, equipment changes, and precautionary measures such as required daily and monthly inspections and maintenance. All SPCC inspections and maintenance are documented and records are maintained on the platform.

## S E C T I O N 5

# Mitigation Measures Incorporated into the Program

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## 5.1 SPILL PREVENTION AND RESPONSE

Current production operations of Platform Holly pose some potential impacts to marine water quality in the area.

Proposed re-drilling and production will not increase the current risk of an offshore oil spill and subsequent potential impacts to marine water quality. To minimize the potential threats of a marine spill due to drilling and production activities, Venoco will continue to implement its oil spill prevention and response program which includes ongoing spill prevention and response planning, training, and drills.

Venoco's Oil Spill Contingency Plan (OSCP) for the South Ellwood Field is up to date and accurate for the re-drilling activities, however, the Plan will be reviewed and updated as necessary for the installation of any new equipment.

Current research suggests that oil and gas production out of the South Ellwood offshore field, and the subsequent reduction in reservoir pressure, will result in a further reduction in the volume of natural seeps in the area. The greater the amount of hydrocarbons produced, the greater the reduction in the natural seeps.

Refer to Section 4.8 for additional discussion of pollution prevention and safety response.

## 5.2 FLUIDS HANDLING AND DISPOSAL

Platform Holly is a zero discharge facility. Whenever practical, fluids and cuttings will be disposed of in porous subsurface rock strata through an offshore well. Materials not injected will be removed from the platform in plastic lined bins or sealed drums and taken to an approved onshore disposal site. By following these procedures, there should be no effect on marine water quality, the bottom habitat in the immediate area of the platform, or on marine biota. Refer to Section 3.5.5 for additional discussion of drilling fluids and disposal procedures.

## 5.3 VESSELS

A crew boat makes regular runs between the Ellwood Pier and Platform Holly for crew changes and delivery of supplies. The frequency of trips varies depending on activities on the platform. Supply boats bring larger supplies from Port Hueneme or Venoco Casitas Pier on an as-needed basis.

During drilling, testing, and production of new or re-completed wells, the number of boat trips will not exceed the amount allowed under existing Platform Holly air permits. Therefore, both the re-drilling and operations vessel traffic will not cause any disruption to commercial fishing, including minimizing potential impacts to the kelp beds, and other potentially sensitive species/habitats, such as surf grass, eelgrass, or hard bottom substrates (if present). The primary commercial and recreational fishing area in the program vicinity is Naples Reef. Drilling-related vessel trips will not occur in the Naples Reef area. Venoco will continue its membership in the Joint Oil/Fisheries Liaison Group to address any impacts to commercial fishing.

## **5.4 NOISE**

Current Platform Holly noise levels are not distinguishable at any noise sensitive land use receptors because of the distance from shore. Noise analysis conducted for the Subsea Well Abandonment and Flowline Abandonment/Removal (SWARS) Program estimated ambient noise levels inland from shore and at the shore at approximately 40 dBA and 60 dBA, respectively. The analysis showed that, at distances ranging from approximately 1.0 to 2.0 miles, noise levels from program activities would decrease to levels that would not significantly alter the ambient noise levels.

Observed noise data reduced to a standard distance of 50 feet include offshore drilling platform noise levels ranging from 65-to-76 dBA, and typical drilling operations noise levels ranging from 60-to-84 dBA. Crew and supply boat noise measurements, corrected for background level and adjusted to a standard distance of 50 feet, indicate a range in average levels from 82-to-92 dBA.

Venoco has periodically conducted drilling and workover operations on Platform Holly since the purchase in 1999, with no adverse noise impacts. Due to the distance (more than two miles) from any community noise receptor, and the temporary duration of the drilling noise sources, no significant community noise impacts are anticipated.

## **5.5 VISUAL**

Platform Holly is located approximately two miles offshore from Ellwood Beach in waters under the jurisdiction of the State Lands Commission (SLC). It covers an area of approximately 9,600 square feet (80 feet by 120 feet) and stands approximately 60 feet above mean water level. It has three decks and is painted white. The levels stand at 25 feet, 38 feet, and 60 feet above sea level. General machinery and processing equipment are located on the bottom two decks. The top deck is used to support well drilling and workover operations, and includes the drilling rig, hoist, and derrick for pulling pipe, pipe storage areas, crane, gas lift and shipping compressors, and heliport. The platform can be seen from many locations, including Highway 101, many public beaches, the UCSB campus, and various public use areas both in the daytime and nighttime due to its illumination. However, utility and safety lighting is screened wherever possible to minimize the visibility from onshore viewpoints.

Proposed re-drilling will not alter the existing rig's visual appearance or add a substantial new source of light or glare. During re-drilling operations, lighting and flaring at the platform will continue but will remain within the limits of Venoco's present permits. Lighting installations will continue to be appropriately shielded to avoid glare towards the shore or onto the ocean surface.

## 5.6 SEEP REDUCTION

Reduction in natural marine hydrocarbon seepage is occurring in the vicinity of the South Ellwood oil field and is directly related to oil and gas production at Platform Holly. Venoco's proposed lease line adjustment project will drill 6 extension wells into previously undrained portions of the reservoir directly below active seeps. Consistent with what has already been observed and documented on the existing 3242.1 lease, production in the proposed extension area will result in a lowering of reservoir pressure and a reduction in natural seep activity.

The reduction of seeps related to oil and gas production is well documented. There are numerous academic (peer reviewed) articles that support this relationship and the reduction can be quantified and defended with data<sup>4,5</sup>. To discount this relationship or its positive environmental impact would require ignoring scientific fact, laws of physics, published data and common sense.

*"Comparison of the seep distributions over time reveals more than 50% decrease in the areal extent of seepage, accompanied by declines in seep emission volume...Declines in reservoir pressure and depletion of seep hydrocarbon sources associated with oil production are the mechanism inferred to explain the declines..."*

*"Oil production from the Monterey Formation oil and gas reservoir caused subsequent declines in reservoir pressure, thus removing the primary driving mechanism of the seepage"*

*(Quigley et al. 1999)*

Naturally occurring marine hydrocarbon seeps are common though out the world, but few are as prolific as those found in the Santa Barbara Channel<sup>6</sup>. The physics behind this process are relatively simple: Oil and natural gas are lighter than water and due to buoyant forces they move upward through the sediment they were generated in, eventually reaching the earth's surface, ocean and atmosphere.

The main source of these seeps is the Monterey Formation, which is a world renowned petroleum source and reservoir rock. Directly below this active seep field is the South Ellwood anticline, an elongated dome type structure creating a trap for oil and gas to accumulate. This accumulation or reservoir was discovered in 1964 and named South Ellwood Oil Field. Seep activity is concentrated directly above this oil and gas reservoir and production has resulted in significant reduction in reservoir pressure and a decrease in the driving force behind these seeps.

The South Ellwood field is unique in that a portion of seep volumes can be directly measured at the sea floor due to the placement of seep tents in 1982<sup>7</sup> (Refer to Figure 5.6-1). These structures were set on the sea floor directly above a very active seep area, with the intent to capture and

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<sup>4</sup> Hornafius, J. S., Quigley, D. C., and Luyendyk, B. P., 1999, The world's most spectacular hydrocarbons seeps (Coal Oil Point, Santa Barbara Channel, California): Quantification of emissions: Journal of Geophysical Research Oceans, v. 104, no. C9, p. 20,703-20,711.

<sup>5</sup> Quigley, D. C., Hornafius, J. S., Luyendyk, B. P., Francis, R. D., Clark, J. Washburn, L., 1999, Decrease in natural marine hydrocarbon seepage near Coal Oil Point, California, associated with offshore oil production: Geology, v. 27, no. 11, p. 1047-1050.

<sup>6</sup> Ibid.

<sup>7</sup> Guthrie, L. D., and Rowley, P. R., 1983, Containment of naturally occurring subsea hydrocarbon emissions - A project review: Offshore Technology Conference, 15th, Paper 4446, p. 33-38.

produce the natural gas released and to reduce local air emissions related to these seeps. Figures 5.6-1 and 5.6-2 show the production history and cumulative gas produced from this tent structure. The tents have captured 7.6 billion cubic feet (Bcf) of natural gas to date. This is equivalent to 35,340 tons of ROC's.

For reference, Platform Holly and EOF operation together result in approximately 150 tons of ROC's per year. Production from these tents has been steadily declining through the past 30 years and production ceased in 2013. The decline in seep tent production (Figure 5.6-1, green line) clearly correlates to the overall field decline (Figure 5.6-2, red line). The reduction and eventual cessation of seep activity is a direct result from hydrocarbon production and lowering of pore-pressure within the subsurface reservoir directly below this area. Production from the seep tents represents a very large volume of methane and ROC's that were removed from the local atmosphere. It is important to note however that the seep tents cover less than 1 acre (29,200 ft<sup>2</sup>) in total, which represents a very small fraction of the active seep field that extends for thousands of acres (Fig 5.6-1). The total amount of seeps reduced within the entire field area is unknown, but it is within reason to expect reduction throughout the entire field where reservoir pressures have been lowered.

The South Ellwood anticline and reservoir extend approximately 3.75 miles to the east beyond the existing 3242.1 lease boundary. The seep field follows the crest of this anticline and has been mapped to the easterly extent of the reservoir (Quigley, et al., 1999, Figure 5.6-1). Extension wells into this undrained portion of the reservoir to the east of the existing 3242.1 lease line will result in a reduction of reservoir pressure ultimately leading to less seeps and emissions. The proposed development wells in this project will be placed in the reservoir directly below active seeps, and will impact seepage over several thousand acres of sea floor. Lowering of reservoir pressure within such a large area is expected to have significant reduction in seep activity and related emissions.

## 17: Figure 5.6-1 Seep Location Map

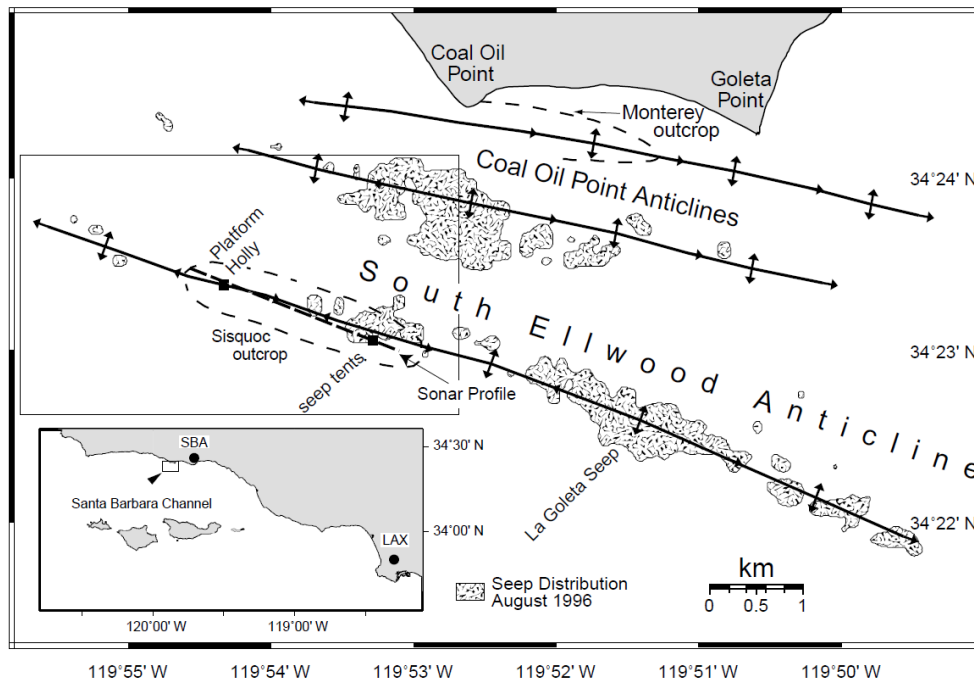


Figure 1. Offshore Coal Oil Point study area. Fault locations and anticline-syncline pairs in Monterey and Siquoc Formations of northern Santa Barbara Channel shelf determine seep distribution. Mapped distribution of seepage is from 3.5 kHz sonar survey during August 1996. Area of seepage comparison is boxed 13 km<sup>2</sup> area surrounding Platform Holly. Arrow points to sonar profiles in Figure 2. SBA—Santa Barbara Airport. LAX—Los Angeles International Airport.

*Geology*; November 1999; v. 27; no. 11; p. 1047–1050; 4 figures.

1047

## 18: Figure 5.6-2 Seep Tent Gas Production &amp; Oil Production

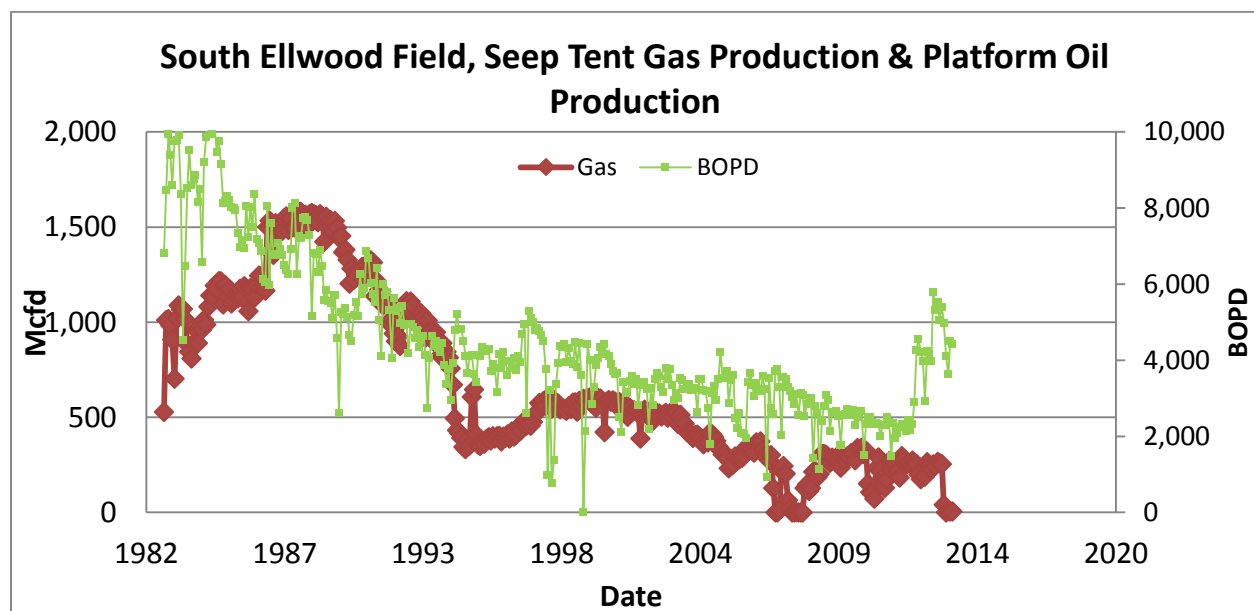


Figure 2: Graph showing daily production rates through time: Oil produced from Platform Holly (green) and gas produced from seep tents (red). Oil units are gross - barrels per day (BOPD) and gas

units are gross - thousand cubic feet per day (Mcf). Explanation: As oil and gas are produced from the reservoir, the pressure within it decreases and therefore the rate of production decreases. Seep tent production rates show a very similar decline due to this decrease in reservoir pressure. Production of seep gas ceased completely in late 2013. Future production from platform Holly will result in lowering of reservoir pressure and continued decrease in seep activity.

19: Figure 5.6-3 Cumulative Seep Tent Production

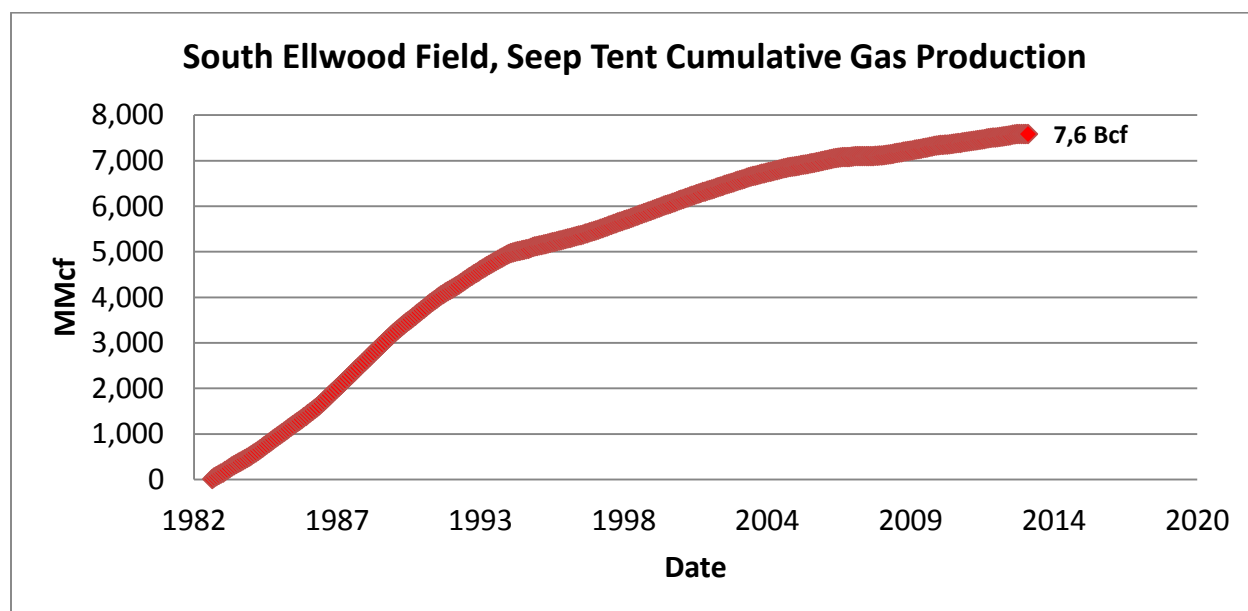


Figure 5.6-3: Graph showing cumulative production of gas from seep tents. Total amount produced to date is 7.6 billion cubic feet (Bcf).

## 5.7 AIR EMISSIONS

The program will result in short-term construction-related emissions associated with re-drilling which will not exceed the emission limits for Platform Holly operations as listed in the existing air permit (PTO 8234-R8). Air emissions were reviewed for the re-drill program based on estimated fuel usage from all equipment involved. Emission sources for the program include a diesel crane, three natural gas-fired generator engines, as well as a crew and a supply boat. Emission factors and maximum permitted fuel use for each source are based on the Platform Holly air permit (PTO 8234-R8) as issued by the Santa Barbara County APCD.

The program will comply with all applicable APCD rules because all proposed activities will be done within conditions of the existing permit and APCD rules.



## Emissions Calculations

Baseline data and emission factors are shown in Table 5.7-1 for drilling-related equipment. Daily and annual emissions for this equipment are shown in Tables 5.7-2 and 5.7-3, respectively. Baseline data and emission factors are shown in Table 5.7-4 for non-drilling related equipment. Daily and annual emissions for this equipment are shown in Tables 5.7-5 and 5.7-6, respectively. Emissions from this non-drilling equipment will not be affected by the drilling program. Usage data and emission factors for drilling related equipment during operations are shown in Table 5.7-7. Daily and annual emissions for this equipment are shown in Tables 5.7-8 and 5.7-9, respectively. The various assumptions are given in the table footnotes.

### 7: Table 5.7-1 Parameters for Maximum Drilling Related Daily Emissions Baseline

**Table 1: Parameters for Maximum Daily Emissions Baseline - June 23, 2012**

Equipment	Recorded Data		Permitted Emission Factors from PTO No. 8234-R8 (Dec 2011)						
	Amount	Units	NO <sub>x</sub>	ROC	CO	SO <sub>x</sub>	PM <sub>10</sub>	CO <sub>2</sub> e	Units
Crane	17.0	gal/da	2.69	0.31	2.6	0.006	0.01	556.6	g/hp-hr
Generator No. 1	803.3	MMBtu/mo	0.166	0.037	0.292	0.013	0.046	117.1	lb/MMBtu
Generator No. 2	281.0	MMBtu/mo	0.166	0.037	0.292	0.013	0.046	117.1	lb/MMBtu
Generator No. 3	1573.8	MMBtu/mo	0.143	0.143	0.215	0.013	0.046	117.1	lb/MMBtu
Crew Boat Main Engines	126	gal/da	561	15.8	78.3	56.34	31.68	22413.2	lb/1000 gals
Crew Boat Auxiliary Engines	30	gal/da	600	48.98	129.26	56.34	40.49	22413.2	lb/1000 gals
Supply Boat Main Engines	931	gal/da	561	15.8	78.3	56.34	31.68	22413.2	lb/1000 gals
Supply Boat Auxiliary Engines	30	gal/da	600	48.98	129.26	56.34	40.49	22413.2	lb/1000 gals

**Notes:**

Crane: Gal/day is from monthly log of crane usage for Jun 23, 2012. Hp-hr/day conversion is based on SBCAPCD default factor of 0.055 gal/hp-hr.

Generators: MMBtu/mo is from the June 2012 Monthly Compliance Verification Report (MCVR) to APCD. MMBtu/day is monthly usage averaged over 30 days (daily usage not recorded).

Crew and Supply Boats: Gal/day is from Supply Boat Fuel Use Log for June 23, 2012. Supply boat was Jackie C. Crew boat was Doug C.

### 8: Table 5.7-2 Drilling Related Emissions for Max Baseline Day

**Table 2: Drilling-Related Emissions for Max Baseline Day - June 23, 2012**

Equipment	Max Daily Fuel Use		Baseline Daily Emissions (lbs/day)				
	Amount	Units	NO <sub>x</sub>	ROC	CO	SO <sub>x</sub>	PM <sub>10</sub>
Crane	309.1	hp-hr/day	1.8	0.2	1.8	0.0	0.0
Generator No. 1	26.8	MMBtu/da	4.4	1.0	7.8	0.3	1.2
Generator No. 2	9.4	MMBtu/da	1.6	0.3	2.7	0.1	0.4
Generator No. 3	52.5	MMBtu/da	7.5	7.5	11.3	0.7	2.4
Crew Boat Main Engines	126	gal/da	70.7	2.0	9.9	7.1	4.0
Crew Boat Auxiliary Engines	30	gal/da	18.0	1.5	3.9	1.7	1.2
Supply Boat Main Engines	931	gal/da	522.3	14.7	72.9	52.5	29.5
Supply Boat Auxiliary Engines	30	gal/da	18.0	1.5	3.9	1.7	1.2
<b>Total</b>			<b>644.3</b>	<b>28.7</b>	<b>114.1</b>	<b>64.1</b>	<b>40.0</b>

**Notes:**

Calculated from information in Table 1.

## 9: Table 5.7-3 Annual Usage and Baseline Emissions

Table 3: Annual Usage and Baseline Emissions - 2012

Equipment	2012 Usage		Baseline Annual Emissions (tons/yr)					
	Amount	Units	NO <sub>x</sub>	ROC	CO	SO <sub>x</sub>	PM <sub>10</sub>	CO <sub>2</sub> e
Crane	234,824	hp-hr/yr	0.7	0.1	0.7	0.0	0.0	144
Generator No. 1	9,720	MMBtu/yr	0.8	0.2	1.4	0.1	0.2	569
Generator No. 2	7,991	MMBtu/yr	0.7	0.1	1.2	0.1	0.2	468
Generator No. 3	12,019	MMBtu/yr	0.9	0.9	1.3	0.1	0.3	704
Crew Boat Main Engines	54.1	1000 Gal/yr	15.2	0.4	2.1	1.5	0.9	606
Crew Boat Auxiliary Engines	11	1000 Gal/yr	3.3	0.3	0.7	0.3	0.2	123
Supply Boat Main Engines	94.5	1000 Gal/yr	26.5	0.7	3.7	2.7	1.5	1059
Supply Boat Auxiliary Engines	10	1000 Gal/yr	3.0	0.2	0.6	0.3	0.2	112
Total			51.0	3.0	11.7	5.0	3.5	3,785

Notes:

Crane: Crane hp-hr is based on 2012 total fuel usage logged (12915 gallons) at 0.055 gal/hp-hr.

Generators: Annual generator usage is from the 2012 Annual Compliance Verification Report to APCD.

Crew and Supply Boats: Annual boat usage is from the 2012 Holly Compliance Verification Report to APCD.

## 10: Table 5.7-4 Parameters for Non-Drilling Sources

Table 4: Parameters for Non-Drilling Sources

Equipment	Usage Data		Permitted Emission Factors from PTO No. 8234-R8 (Dec 2011)						
	Amount	Units	NO <sub>x</sub>	ROC	CO	SO <sub>x</sub>	PM <sub>10</sub>	CO <sub>2</sub> e	Units
Flares, Pilot and Purge	4,409	MMBtu/yr	0.068	0.086	0.37	0.037	0.02	117.1	lb/MMBtu
Flares, Unplanned	3.34	MMBtu/yr	0.068	0.086	0.37	2.612	0.02	117.1	lb/MMBtu
Fugitives	79.22	tons ROC/yr	-	79.22	-	-	-	-	tons/yr
Pigging, Oil	1.4	cu. ft. (acf)	-	0.016	-	-	-	-	lb/acf-event
Pigging, Gas	1.4	cu. ft. (acf)	-	0.000	-	-	-	-	lb/acf-event
Tanks (T-1, T-4)	0.167	tons ROC/yr	-	0.17	-	-	-	-	tons/yr
Solvents & Coatings	2	lb ROC/da	-	2	-	-	-	-	lb ROC/da
Boom Boat	15	minutes	1.1	90	212	0.27	23	710.77	g/hp-hr
Emergency Generator	3.5	gal/da	14.06	1.12	3.03	0.93	0.984	556.58	g/hp-hr

Notes:

Flares: Usage is from 2013 Compliance Verification Report submitted to APCD. Daily is based on uniform usage.

Fugitives: Emissions from 2013 Compliance Verification Report submitted to APCD. Daily is based on uniform usage.

Pigging: 1 event each assumed for baseline day.

Tanks: Emissions from 2013 Compliance Verification Report submitted to APCD. Daily is based on uniform usage.

Solvents & Coatings: Nominal usage assumed for baseline day.

Boom Boat: Nominal usage assumed for baseline day at 20% load on 225 hp engine for testing in situ.

Emergency Generator: Typical usage for a day in which the generator is tested.

## 11: Table 5.7-5 Non-Drilling Related Daily Baseline Emissions

Table 5: Non-Drilling-Related Daily Baseline Emissions

Equipment	Daily Use		Baseline Daily Emissions (lbs/day)				
	Amount	Units	NO <sub>x</sub>	ROC	CO	SO <sub>x</sub>	PM <sub>10</sub>
Flares, Pilot and Purge	12.1	MMBtu/da	0.8	1.0	4.5	0.4	0.2
Flares, Unplanned	0.0	MMBtu/da	0.0	0.0	0.0	0.0	0.0
Fugitives	79.22	tons/yr	-	434.1	-	-	-
Pigging, Oil	1	event/da	-	0.02	-	-	-
Pigging, Gas	1	event/da	-	1.4	-	-	-
Tanks (T-1, T-4)	0.17	tons/yr	-	0.9	-	-	-
Solvents & Coatings	2	lb ROC/da	-	2.0	-	-	-
Boom Boat	11.25	hp-hr/da	0.0	2.2	5.3	0.0	0.6
Emergency Generator	63.6	hp-hr/da	2.0	0.2	0.4	0.1	0.1
Total			2.8	441.8	10.2	0.6	1.0

Notes:

Calculated from information in Table 1.

## 12: Table 5.7-6 Non-Drilling Related Annual Baseline Emissions

Table 6: Non-Drilling-Related Daily Baseline Emissions

Equipment	Baseline Annual Emissions (tons/yr)					
	NO <sub>x</sub>	ROC	CO	SO <sub>x</sub>	PM <sub>10</sub>	CO <sub>2</sub> e
Flares, Pilot and Purge	0.15	0.19	0.82	0.06	0.04	258
Flares, Unplanned	0.00	0.15	0.00	0.00	0.00	0
Fugitives	-	79.22	-	-	-	-
Pigging, Oil	-	0.00	-	-	-	-
Pigging, Gas	-	0.00	-	-	-	-
Tanks (T-1, T-4)	-	0.17	-	-	-	-
Solvents & Coatings	-	0.04	-	-	-	-
Boom Boat	0.00	0.00	0.00	0.00	0.00	0
Emergency Generator	0.02	0.00	0.00	0.00	0.00	1
Total	0.2	79.8	0.8	0.1	0.0	259

Notes:

Annual emissions for these sources are taken from the 2013 Compliance Verification Report (CVR) submitted to APCD, except that CO<sub>2</sub>e is calculated using the emission factors in Table 4 since CO<sub>2</sub>e is not reported in the CVR.

## 13: Table 5.7-7 Parameters for Maximum Drilling Related Daily Emissions

Table 7: Parameters for Maximum Drilling-Related Daily Emissions

Equipment	Usage Data		Permitted Emission Factors from PTO No. 8234-R8 (Dec 2011)						
	Amount	Units	NO <sub>x</sub>	ROC	CO	SO <sub>x</sub>	PM <sub>10</sub>	CO <sub>2</sub> e*	Units
Crane	120	gal/da	2.69	0.31	2.6	0.006	0.01	556.6	g/hp-hr
Generator No. 1	7.59	MMBtu/hr	0.166	0.037	0.292	0.013	0.046	117.1	lb/MMBtu
Generator No. 2	7.59	MMBtu/hr	0.166	0.037	0.292	0.013	0.046	117.1	lb/MMBtu
Generator No. 3	8.10	MMBtu/hr	0.143	0.143	0.215	0.013	0.046	117.1	lb/MMBtu
Crew Boat Main Engines	250	gal/da	561	15.8	78.3	56.34	31.68	22413.2	lb/1000 gals
Crew Boat Auxiliary Engines	30	gal/da	600	48.98	129.26	56.34	40.49	22413.2	lb/1000 gals
Supply Boat Main Engines	600	gal/da	4.32	0.48	2.6	0.21	0.15	556.6	g/hp-hr
Supply Boat Auxiliary Engines	30	gal/da	4.32	0.48	2.6	0.21	0.15	556.6	g/hp-hr

\* CO<sub>2</sub>e emission factors are from the CARB Mandatory Reporting Rule for Greenhouse Gases, converted to appropriate units.

Notes:

Crane: Gal/day is the permitted daily fuel limit. Hp-hr/day conversion is at 0.055 gal/hp-hr.

Generators: MMBtu/hr is the permitted daily fuel limit.

Crew and Supply Boats: Crew boat main engines typically burn about 50 gallons per round trip from the Ellwood Pier to Platform Holly. 30 gallons per day are assumed to be burned by the auxiliary engines (generators) per boat owner/operator. A maximum of 5 crew boat trips per day is anticipated. Tier 0 engines are assumed. Supply boat main engines are estimated to burn up to 600 gallons per round trip, and auxiliary engines are estimated to burn 30 gallons per day. Main and auxiliary engines will be Tier 2 or better. Hp-hr/day conversion is at 0.055 gal/hp-hr.

## 14: Table 5.7-8 Drilling Related Emissions for Worst-Case Day

Table 8: Drilling-Related Emissions for Worst-Case Day

Equipment	Max Daily Fuel Use		Baseline Daily Emissions (lbs/day)				
	Amount	Units	NO <sub>x</sub>	ROC	CO	SO <sub>x</sub>	PM <sub>10</sub>
Crane	2181.8	hp-hr/day	12.9	1.5	12.5	0.0	0.0
Generator No. 1	182.2	MMBtu/da	30.2	6.7	53.2	2.4	8.4
Generator No. 2	182.2	MMBtu/da	30.2	6.7	53.2	2.4	8.4
Generator No. 3	194.4	MMBtu/da	27.8	27.8	41.8	2.5	8.9
Crew Boat Main Engines	250	gal/da	140.3	4.0	19.6	14.1	7.9
Crew Boat Auxiliary Engines	30	gal/da	18.0	1.5	3.9	1.7	1.2
Supply Boat Main Engines	10,909	hp-hr/day	103.9	11.5	62.5	5.1	3.6
Supply Boat Auxiliary Engines	545	hp-hr/day	5.2	0.6	3.1	0.3	0.2
Total Emissions			368.6	60.3	249.8	28.4	38.7
Baseline Emissions			644.3	28.7	114.1	64.1	40.0
APCD Daily Limits			1,835	116	417	181	126

Notes:

Calculated from information in Table 7. APCD limits are for listed equipment only.

Table 9: Annual Drilling-Related Usage and Emissions

Equipment	Annual Usage		Baseline Annual Emissions (tons/yr)					
	Amount	Units	NO <sub>x</sub>	ROC	CO	SO <sub>x</sub>	PM <sub>10</sub>	CO <sub>2</sub> e
Crane	545,455	hp-hr/yr	1.6	0.2	1.6	0.0	0.0	335
Generator No. 1	32,789	MMBtu/yr	2.7	0.6	4.8	0.2	0.8	1,920
Generator No. 2	32,789	MMBtu/yr	2.7	0.6	4.8	0.2	0.8	1,920
Generator No. 3	34,992	MMBtu/yr	2.5	2.5	3.8	0.2	0.8	2,049
Crew Boat Main Engines	54.1	1000 Gal/yr	15.2	0.4	2.1	1.5	0.9	606
Crew Boat Auxiliary Engines	11.0	1000 Gal/yr	3.3	0.3	0.7	0.3	0.2	123
Supply Boat Main Engines	1,403	1000 hp-hr/yr	6.7	0.7	4.0	0.3	0.2	861
Supply Boat Auxiliary Engines	70.1	1000 hp-hr/yr	0.3	0.0	0.2	0.0	0.0	43
Total Emissions			35.0	5.4	21.9	2.8	3.6	7,856
Baseline Emissions			51.0	3.0	11.7	5.0	3.5	3,785
APCD Daily Limits			193.3	15.5	54.8	18.9	14.8	

**Notes:**

Calculated from information in Table 7. APCD limits are for listed equipment only.

Crane: Crane hp-hr is based on the permit limit of 30,000 gal/yr at 0.055 gal/hp-hr.

Generators: Annual generator usage is based on the daily permit limit and 180 days/yr.

Crew and Supply Boats: Annual crew boat usage assumes no change from 2012 emissions since crew boat usage is not expected to be impacted by the drilling program.  
Supply boat usage is based on 5 trips per week for 180 days/yr at the maximum rates shown in Table 7.

## **Attachment 1: Revisions**

### Project Application Form:

- 1) Page 7 (Section E, Item 1, Paragraph 2): Replace last sentence with the following:

After Adjustment, the net acreage holding of Venoco will decrease by 431 acres.

### Project Description:

- 1) Page 1 (Section 1.4, Paragraph 1): Replace last sentence with the following:

After Adjustment, the net acreage holding of Venoco will decrease by 431 acres.

- 2) Page 2 (Figure 1.4-1): Replace with new Location Map showing revised lease adjustment boundary.
- 3) Page 5 (Figure 2.1-1): Replace with new Structure-Contour Map showing revised lease adjustment boundary.
- 4) Page 8 (Section 2.2, Paragraph 1): Replace entire paragraph 1 with the paragraph below; insert new Figure 2.2-1 :

The existing state lease PRC 3242.1 comprises approximately 4,290 acres. This program will adjust the eastern boundary so as to extend the lease to allow for more efficient production of state resources. The area within the proposed adjusted lease boundary equals 3400 acres (Figure 2.2-1). As part of this project, Venoco will quitclaim portions of PRC 3242.1 and PRC 3120.1 to compensate for acreage added to lease PRC 3242.1. Total acreage quitclaimed from both PRC 3242.1 and PRC 3120.1 is 3,831 acres. The net acreage holding after adjustment will decrease 431 acres. This project will result in a net of 431 acres quitclaimed back to the State of California. See Figure 2.2-1 for detail on the adjusted PRC 3242.1 boundary and quitclaim areas.

- 5) Page 9 (Section 3.1 Program Description – Objectives): Add the following paragraph to end of section 3.1:

As part of this project, portions of PRC 3242.1 and PRC 3120.1 will be quitclaimed by Venoco, Inc to the State of California to compensate for acreage added to lease 3242.1. The area within the proposed adjusted lease boundary equals 3400 acres (Figure 3.2-1). The proposed area to be quitclaimed is 3,831. This project will result in a net of 431 acres quitclaimed back to the State of California. As part of this



proposal, Venoco would also reserve certain pipeline and power cable corridors, pursuant to its existing leasehold rights or by obtaining new surface right-of-way(s) to cross a portion of PRC 3120.1 connecting Platform Holly to Shore.

- 6) Page 11 (Figure 3.2-1): Replace with new Proposed Lease Line Adjustment Figure.
- 7) Page 21 (Section 3.4.1): Change Title of Section to “Adjustment of Existing Leases”. Replace entire section 3.4.1 (legal description) with text below:

The proposed program involves the adjustment of eastern boundary of existing Lease PRC 3242.1. No new lease or extension of existing lease term is required for this program. The life of the South Ellwood oil field and its production facilities (Platform Holly and EOF) is a function of the size of the reservoir and the rate at which it can be economically developed.

The program also proposes to quitclaim portions of PRC 3242.1 and PRC 3120.1 to compensate for acreage added to lease PRC 3242.1. Total acreage quitclaimed from both PRC 3242.1 and PRC 3120.1 is 3,831 acres. The net acreage holding after adjustment will decrease 431 acres. This project will result in a net of 431 acres quitclaimed back to the State of California.

#### **Legal Description of Adjusted PRC 3242.1 Easterly Boundary:**

A legal description of Venoco’s proposed PRC 3242.1 adjusted easterly boundary follows. For clarity, the existing PRC 3242.1 is referred to as “Parcel 1” and the proposed extension area is referred to as “Parcel 2:”

*Two parcels of submerged land in the Santa Barbara Channel, near Isla Vista, in Santa Barbara County, California, being further described as follows:*

*Commencing at a point on the Mean High Tide line of the above-mentioned Santa Barbara Channel, as determined from the Mean High Tide Line shown in Book 41, page 52, of Miscellaneous Maps and Book 55, page 87, Record of Surveys Records of Santa Barbara County, California, at the intersection with a North-South Grid line having a CCS27, Zone 5, coordinate of North 335,429.34 feet, East 1,433,532.48 feet, said point being the northeasterly corner of State Lands Commission, Oil and Gas Lease PRC 3242.1, said point also being the TRUE POINT OF BEGINNING of Parcel One (Existing PRC 3242.1 Lease), thence S 01° 04’ 17” W a distance of 2946.24 feet along the east line of the above mentioned PRC 3242.1, to a point hereafter referred to as “Point A”, said point has a CCS27, Zone 5, coordinate North 332,483.61 feet, East 1,433,477.39 feet ; thence, continuing southerly along said east*

*line of PRC 3242.1 S 01° 04' 17" W a distance of 8889.86 feet to a point hereafter referred to as "Point B" ,said point has a CCS27, Zone 5, coordinate of North 323,595.30 feet, East 1,433,311.16 feet, thence, continuing southerly along said east line of PRC 3242.1 S 01° 04' 17" W a distance of 6647.99 feet to the southeast corner of said PRC 3242.1; thence, now leaving said east line, westerly along the California State Lands 3 Mile Limit Line to the southwest corner of said PRC 3242.1; thence north, along the west line of said PRC 3242.1 a distance of 21,673.38 feet to a point on the southeasterly line of PRC 421.1; thence along said southeasterly line of PRC 421.1; N 41° 12' 17" E a distance of 1016.36 feet to a point on said southeasterly line of PRC 421.1, said point is also the most northwesterly corner of said PRC 3242.1; thence southeasterly along said Mean High Tide line of the Santa Barbara Channel to the TRUE POINT OF BEGINNING of Parcel One. Parcel One has an area of 188,215,825.16 sq. feet, 4,320.8 acres.*

*Continuing from said "Point A" as hereinbefore described, said point being the TRUE POINT OF BEGINNING of Parcel Two (PRC 3242.1 Lease Extension Parcel); thence S 70° 30' 53" E a distance of 17,575.13 feet; thence S 00° 00' 00" W a distance of 8,050.22 feet; thence S 90° 00' 00" W a distance of 2,645.37 feet; thence N 70° 22' 24" W a distance of 14,958.47 feet; to said "Point B" as hereinbefore described, said point is on the east line of said PRC 3242.1; thence N 01° 04' 17" E a distance of 8889.86 feet, along the said east line of PRC 3242.1 to the TRUE POINT OF BEGINNING of this description. Parcel Two has an area of 148,125,780 square feet, 3,400.5 acres.*

*Bearings and distances herein are CCS27 Zone 5.*

### **Legal Description for Proposed PRC 3242.1 Quitclaimed Lands:**

A legal description of lands that are proposed to be quitclaimed within PRC 3242.1 upon approval of this project follows. For clarity, the proposed new PRC 3242.1 is referred to as "Parcel 1" and the proposed quitclaim areas are referred to as "Parcel 2" and "Parcel 3".

*Three parcels of submerged land in the Santa Barbara Channel, near Isla Vista, in Santa Barbara County, California, being further described as follows:*

*Commencing at a point on the Mean High Tide line of the above-mentioned Santa Barbara Channel, as determined from the Mean High Tide Line shown in Book 41, page 52, of Miscellaneous Maps and Book 55, page 87, Record of Surveys, Records of Santa Barbara County, California, at the intersection with a North-South Grid line having a CCS27, Zone 5, coordinate of North 335,429.34 feet, East 1,433,532.48 feet,*



*said point being the northeasterly corner of State Lands Commission, Oil and Gas Lease PRC 3242.1, said point also being the TRUE POINT OF BEGINNING of Parcel One (Existing PRC 3242.1 Lease);*

*thence S 01° 04' 17" W a distance of 2,177.58 feet along the east line of the above mentioned PRC 3242.1, to a point hereafter referred to as "Point C", said point has a CCS27, Zone 5, coordinate North 333,252.14 feet, East 1,433,491.76 feet; thence, continuing southerly along said east line of PRC 3242.1 S 01° 04' 17" W a distance of 9,658.53 feet to a point hereafter referred to as "Point D", said point has a CCS27, Zone 5, coordinate of North 323,595.30 feet, East 1,433,311.16 feet; thence, continuing southerly along said east line of PRC 3242.1, S 01° 04' 17" W a distance of 6,647.99 feet to the southeast corner of said PRC 3242.1; thence, now leaving said east line, westerly along the California State Lands 3 Mile Limit Line to the southwest corner of said PRC 3242.1; said point has a CCS27, Zone 5, coordinate of North 319,362.81 feet, East 1,424,750.00 feet; thence north, along the west line of said PRC 3242.1 a distance of 7,285.47 feet to a point hereafter referred to as "Point E", said point has a CCS27, Zone 5, coordinate North 326,648.27 feet, East 1,424,750.00 feet; thence north, along the west line of said PRC 3242.1 a distance of 9,696.98 feet to a point hereafter referred to as "Point F", said point has a CCS27, Zone 5, coordinate North 336,345.26 feet, East 1,424,750.00 feet; thence north, continuing along the west line of said PRC 3242.1 a distance of 4,691.00 feet to a point on the southeasterly line of PRC 421.1; thence along said southeasterly line of PRC 421.1; N 41° 12' 17" E a distance of 1016.36 feet to a point on said southeasterly line of PRC 421.1, said point is also the most northwesterly corner of said PRC 3242.1; thence southeasterly along said Mean High Tide line of the Santa Barbara Channel to the TRUE POINT OF BEGINNING of Parcel One.*

*Parcel One has an area of 188,215,825.16 sq. ft., 4,320.84 acres, more or less.*

*Continuing from said "Point C" as hereinbefore described, said point being the TRUE POINT OF BEGINNING of Parcel Two (PRC 3242.1 Quit Claim Parcel); thence N 70° 30' 53" W a distance of 9,272.85 feet to a point on the west line of said PRC 3242.1; said point is also "Point F" as hereinbefore described, thence N 00° 00' 00" E a distance of 4,691.00 feet along the west line of said PRC 3242.1, to a point on the southeasterly line of PRC 421.1; thence along said southeasterly line of PRC 421.1; N 41° 12' 17" E a distance of 1,016.36 feet to a point on said southeasterly line of PRC 421.1, said point is also the most northwesterly corner of said PRC 3242.1; thence southeasterly along said Mean High Tide Line of the said Santa Barbara Channel to the northeast corner of said PRC 3242.1; thence S 01° 04' 17" W a distance of 2,177.58 feet along the east line of the above mentioned PRC*

*3242.1, to the TRUE POINT OF BEGINNING of Parcel Two (PRC 3242.1 Quit Claim Parcel)*

*Parcel Two has an area of 41,665,163.71 sq. ft., 956.50 acres, more or less.*

*Continuing from said "Point D" as hereinbefore described, said point being the TRUE POINT OF BEGINNING of Parcel Three (PRC 3242.1 Quit Claim Parcel); thence S 01° 04' 17" W a distance of 6,647.99 feet along the east line of said PRC 3242.1 to the southeast corner of said PRC 3242.1; thence, now leaving said east line, westerly along the California State Lands 3 Mile Limit Line to the southwest corner of said PRC 3242.1; said point has a CCS27, Zone 5, coordinate of North 319,362.81 feet, East 1,424,750.00 feet; thence north, along the west line of said PRC 3242.1 a distance of 7,285.47 feet to a point as hereinbefore described as "Point E", said point has a CCS27, Zone 5, coordinate North 326,648.27 feet, East 1,424,750.00 feet; thence, now leaving said west line, S 70° 22' 24" E a distance of 9,089.23 feet; to "Point D" as hereinbefore described and TRUE POINT OF BEGINNING of Parcel Three (PRC 3242.1 Quit Claim Parcel);*

*Parcel Three has an area of 62,510,272.26 sq. ft., 1,435.04 acres, more or less.*

*Bearings and distances herein are CCS27 Zone 5.*

### **Legal Description for Proposed PRC 3120.1 Quitclaimed Lands:**

A legal description of lands that are proposed to be quitclaimed within PRC 3120.1 upon approval of this project follows. For clarity, the proposed new PRC 3120.1 is referred to as "Parcel 1" and the proposed quitclaim areas are referred to as "Parcel 2" and "Parcel 3".

*A parcel of submerged land in the Santa Barbara Channel, near Elwood, in Santa Barbara County, California, being further described as follows:*

*Commencing at a point on the Mean High Tide line of the Santa Barbara Channel, said point being the northwest corner of State Oil and Gas Lease PRC 129.1 and also the northeast corner of PRC 208.1, said point bears N 77° 18' 58" W a distance of 4,865 feet more or less from a 6 inch iron pipe designated as Monument No. 4 on sheet 3 of 6 of a map of a "Survey of the Ordinary High Water Mark", dated February 1954 and recorded in Record of Survey Map Book 35, page 89, Records of Santa Barbara County, State of California, said Monument No. 4 having a CCS27 Zone 5 coordinate of North 345,145.80 feet, East 1,420,819.40 feet is the TRUE POINT OF BEGINNING (TPOB) of the description for Parcel One (Existing PRC 3120.1 Lease); thence from said TPOB, southeasterly along the Mean High Tide Line to a point having a CCS27, Zone 5 coordinate of North 342,436.83 feet, East 1,424,750.00 feet, and being on the landward boundary of State Oil and Gas Lease*

*PRC 421.1 and also being the northeast corner of PRC 3120.1; thence, along the northeast side of said PRC 421.1, N 47°16' 40" W a distance of 180.76 feet to the northwest corner of said PRC 421.1; thence S 41°04' 14" W a distance of 2721.60 feet along the northwest side of said PRC 421.1 to the southwest corner of said PRC 421.1; thence continuing along the southwest side of PRC 421.1 S 48°42' 22" E a distance of 1097.21 feet to the southeast corner of said PRC 421.1; thence continuing along the southeast side of said PRC 421.1, N 41°12' 00" E a distance of 1664.64 feet to a point where the southeast line of PRC 421.1 intersects the east line of PRC 3120.1; thence south a distance of 16,826.44 feet along the east boundary line of said PRC 3120.1 to ; thence northwesterly along the Mean High Tide Parallel Line to the southwest corner of said PRC 3120.1, said corner having a CCS27 Zone 5 coordinate of North 328,335.1 feet, East 1,415,728.6 feet; thence N 01°06' 14" E a distance of 17,882.15 feet along the west side of said PRC 3120.1 to the northwest corner of said PRC 3120.1; thence, now leaving said west side of said PRC 3120.1, S 89°23' 01" E a distance of 3,195.56 feet; thence N 28°51'19" E a distance of 3,372.88 feet along the northeasterly boundary line of said PRC 3120.1 to the TPOB and the end of this description for said Parcel One*

*Parcel One has an area of 143,165,846.94 sq. ft., 3,286.64 acres more or less.*

*Beginning at the above described TRUE POINT OF BEGINNING (TPOB) , the following describes Parcel Two (PRC 3120.1 Quitclaim Parcel); thence from said TPOB, southeasterly along the Mean High Tide Line to a point having a CCS27, Zone 5 coordinate of North 342,436.83 feet, East 1,424,750.00 feet, and being on the landward boundary of State Oil and Gas Lease PRC 421.1 and also being the northeast corner of PRC 3120.1; thence, along the northeast side of said PRC 421.1, N 47°16' 40" W a distance of 180.76 feet to the northwest corner of said PRC 421.1; thence S 41°04' 14" W a distance of 2721.60 feet along the northwest side of said PRC 421.1 to the southwest corner of said PRC 421.1; thence continuing along the southwest side of PRC 421.1 S 48°42' 22" E a distance of 1097.21 feet to the southeast corner of said PRC 421.1; thence continuing along the southeast side of said PRC 421.1, N 41°12' 00" E a distance of 1,664.64 feet to a point where the southeast line of PRC 421.1 intersects the east line of PRC 3120.1; thence south a distance of 4,690.83 feet along the east boundary line of said PRC 3120.1; thence, now leaving said east boundary line, S 90°00'00" W a distance of 8,867.04 feet to a point on the west boundary line said PRC 3120.1; thence N 01°06' 14" E a distance of 5,881.87 feet along said west boundary line of said PRC 3120.1; now leaving said west boundary line, thence S 89°23'01" E a distance of 3,195.56 feet along the north boundary line of said PRC 3120.1; thence N 28°51'19" E a distance of 3,372.88 feet along the northwesterly boundary line of said PRC 3120.1 to the said TPOB and the end of this description.*

*Parcel Two has an area of 58,237,231.93 sq. ft., 1,336.94 acres, more or less.*

*None of the area of PRC 421.1 is contained within this parcel description.*

*Bearings and distances herein are CCS27 Zone 5 Grid values*

*Beginning at the above described southeast corner of said PRC 3120.1, which is also the TRUE POINT OF BEGINNING (TPOB) Parcel Three (PRC 3120.1 Quitclaim Parcel); thence N 00°00'00" E a distance of 2,438.63 feet along the said east boundary line, to a point on said east boundary line, thence, now leaving said east boundary line, N 90° 00' 00" W a distance of 3,441.48 feet to a point on the Mean High Tide Parallel Line; thence southeasterly along said Mean High Tide Parallel Line to the TPOB and the end of this description.*

*Parcel Three has an area of 4,485,879.08 sq. ft., 102.98 acres, more or less.*

## Attachment 2: Revised Figures

Figure 1.4-1

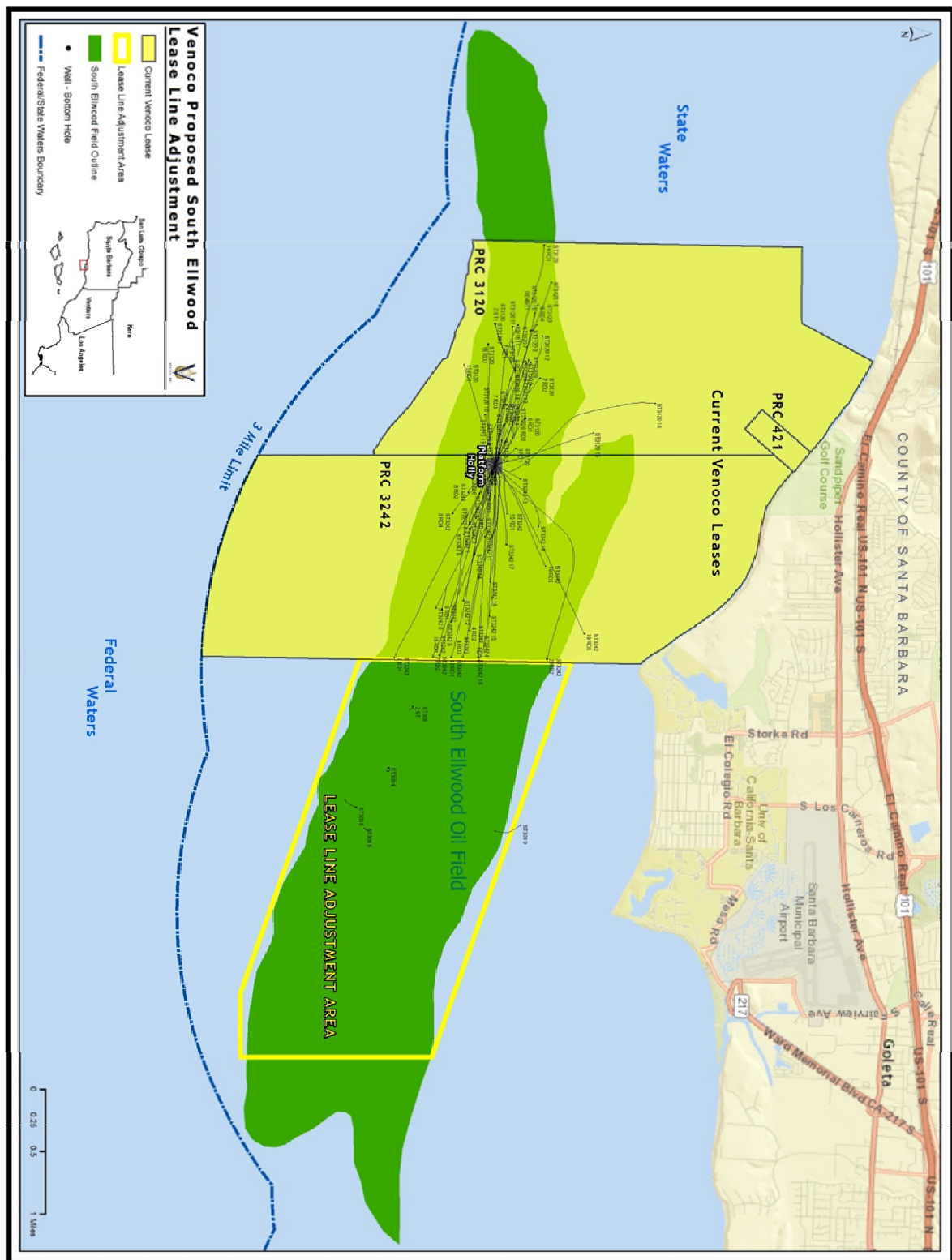
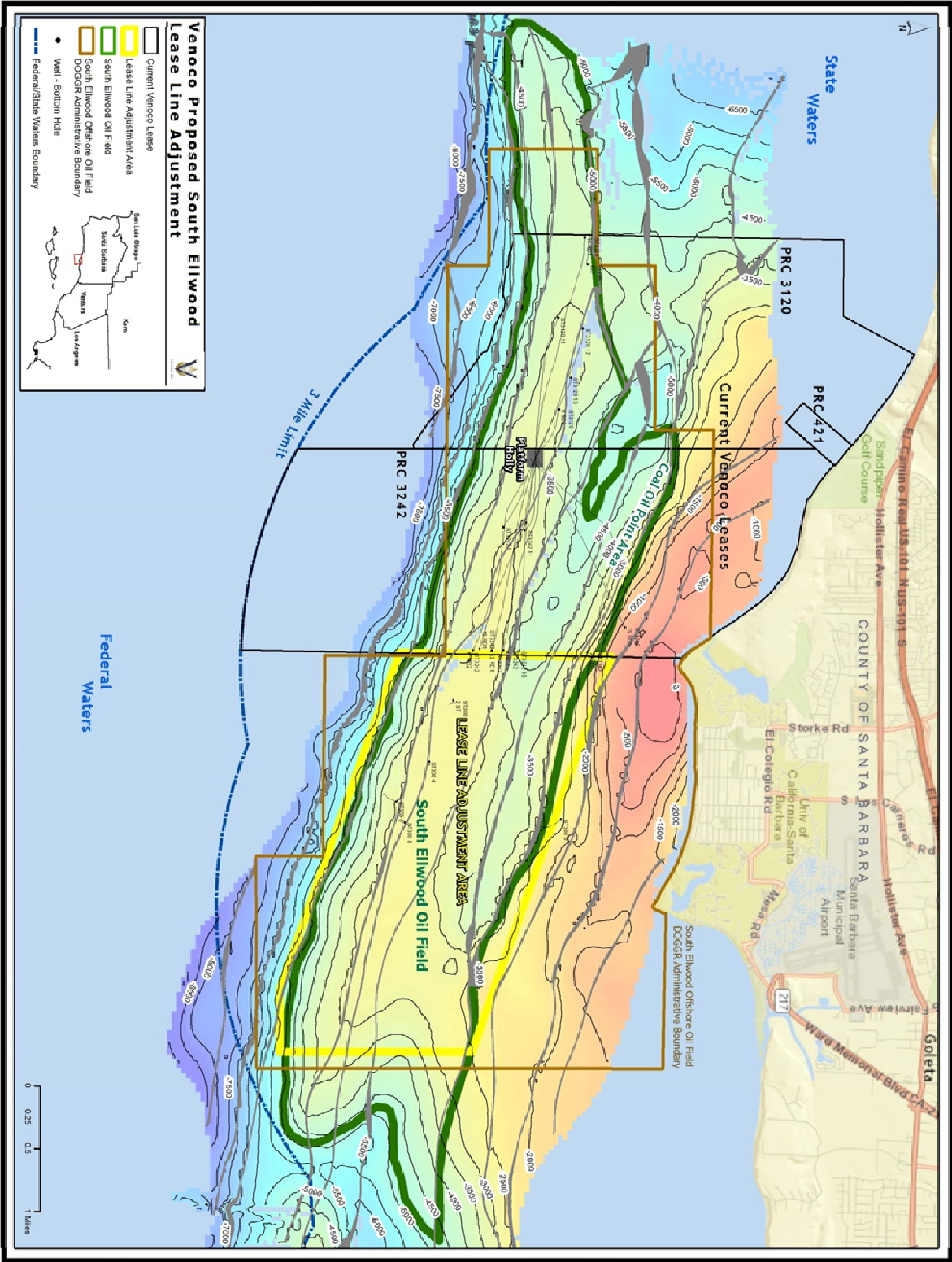


Figure 2.1-1





**Venoco Proposed South Ellwood Lease Line Adjustment**

**Legend:**

- Current Venoco Lease
- Lease Line Adjustment Boundary
- Outdam Acreage
- South Ellwood Field Boundary
- Oil & Gas Seep
- Well - Bottom Hole
- Proposed Well
- 3 Mile Limit
- State Waters
- Federal Waters

**Map Labels:**

- PRC 3120
- PRC 421
- PRC 3242
- Current Venoco Leases
- Pipeline Corridor
- South Ellwood Oil Field
- Proposed Wells
- LEASE LINE ADJUSTMENT ACREAGE
- Seeps
- County of Santa Barbara
- El Camino Real US-101 Nye-101 S
- Sandpiper Golf Course
- Hollister Ave
- Storke Rd
- El Colegio Rd
- Univ of California Santa Barbara
- Santa Barbara Municipal Airport
- Mesa Rd
- 217
- Ward Memorial Blvd CA-217 S
- California Ave
- Goleta
- US-101 N

**Scale:** 0 0.25 0.5 1 Miles

**Venoco Proposed South Ellwood Lease Line Adjustment**

**Legend:**

- Current Venoco Lease
- Lease Line Adjustment Boundary
- Quitclaim Acreage
- South Ellwood Field Boundary
- Oil & Gas Seep
- Federal/State Waters Boundary
- Well - Bottom Hole
- Proposed Well

**Map Labels:**

- State Waters
- 3 Mile Limit
- Current Venoco Leases
- Quitclaim Acreage
- South Ellwood Oil Field
- Proposed Wells
- Seeps
- LEASE LINE ADJUSTMENT ACREAGE
- Federal Waters
- COUNTY OF SANTA BARBARA
- US-101 S
- El Camino Real US-101 S
- Storke Rd
- S Los Caneos Rd
- Hollister Ave
- El Colegio Rd
- Mesa Rd
- 217
- Ward Memorial Blvd CA-217 S
- Goleta
- US-101 N
- El Camino Real
- Santa Barbara Municipal Airport
- Univ of California Santa Barbara

**Scale:** 0 0.25 0.5 1 Miles

**Inset Map:** Santa Barbara, Kern, Los Angeles, Ventura, San Luis Obispo

**Lease Line Adjustment: ~3400 Acres**

**Quitclaim Acreage: ~3831 Acres**